



Designing for Digital Inclusion

Supporting Individuals with Cognitive Disabilities Through Digital Planning Tools

Master's thesis in Industrial Design Engineering

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Master's Thesis 2025

Designing for Digital Inclusion

Supporting Individuals with Cognitive Disability Through Digital Planning Tools

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Göteborg, Sweden 2025

Designing for Digital Inclusion:
Supporting Individuals with Cognitive Disability Through Digital Planning Tools
Thesis in collaboration with Valfärdsteknik Sverige AB
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Print: Chalmers Digitaltryck
Gothenburg, Sweden 2025

Glossary

Term	Definition	Swedish
LSS	Swedish Act concerning Support and Service for Persons with Certain Functional Impairments.	<i>LSS, Lag om stöd och service till vissa funktionsnedsatta</i>
DAC	Daily activity centre - a service within LSS providing occupation for individuals who are not able to be in paid employment	Daglig verksamhet
Group home	Housing with available staff which provides support measures for individuals with comprehensive care needs	Gruppboend / LSS-boende
Participant	A person attending a DAC who takes part in daily activities and receives support.	Deltagare / Brukare
Staff member	Personnel working at DACs (or group homes) who provide support to participants.	Personal
Boet	A digital planning tool developed by Valfärdsteknik Sverige AB, used in group homes and being explored for use in DACs.	Boet
Valfärdsteknik Sverige	The company behind Boet.	Valfärdsteknik Sverige
The Boet team	Employees at Valfärdsteknik Sverige.	Boet-teamet
Organisation developer	Employees from Valfärdsteknik Sverige who guide customers in how to utilise Boet and gather feedback.	Verksamhetsutvecklare
Case officer	A municipal official who assesses individual needs and makes decisions about support services under the LSS Act.	Handläggare

Abstract

This thesis explores how a digital interface can improve support for individuals with cognitive disabilities in their participation at Daily Activity Centres (DACs), and how such support can promote equality, quality of life, and societal participation. DACs are part of Sweden's LSS services and provide meaningful occupation for individuals unable to engage in paid employment. Despite these support structures, people with cognitive disabilities often face digital exclusion and limited participation in society.

The project was carried out in collaboration with Valfärdsteknik Sverige, the developer of Boet, a digital planning tool originally designed for group homes and now being explored for use in DACs. To understand the specific context, challenges, and needs within DACs, observations and interviews were conducted with both staff and participants. These insights were synthesised into design goals and guidelines for creating a digital interface tailored to the DAC environment. Building on these findings, an iterative design process was carried out, resulting in a conceptual design for a web-based planning interface for staff. The design was evaluated in collaboration with DAC personnel to validate its relevance and usability.

The results demonstrate how a digital planning tool, when grounded in user needs and used responsibly, can improve structured planning, individualised support, and digital inclusion at DACs. Ultimately, such tools have the potential to enhance autonomy and well-being as well as contribute to a more equal and inclusive society for individuals with cognitive disabilities.

Acknowledgment

We would like to express our sincere thanks to our supervisor Karin Nilsson, and our examiner Oscar Rexfelt, for their engagement, valuable support and insightful feedback throughout the project.

We also want to extend our thanks to Valfärdsteknik Sverige AB for the opportunity to carry out this project in collaboration with them. We are especially grateful to Jan Miderbäck and Anette Hjalmarsson for their dedication and for always being available to answer our questions. A particular thank you to Jan for initiating the project, and to Anette for connecting us with users and acting as a tour guide when travelling for the user studies. We also appreciate the rest of the team for participating in our workshop, showing interest, and asking thoughtful questions during our presentations.

Lastly, we would like to thank our Industrial Design Engineering program, including all the dedicated teachers and supportive fellow students. The knowledge and experiences we've gained over the years have equipped us with a strong and versatile toolbox, which has been invaluable for tackling the challenges of this project as well as those that lie ahead.

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1. Introduction

1.1 Background

Around 79,000 Swedes live with disabilities that entitle them professional support (Socialstyrelsen, 2024b). According to a study conducted by Statistiska centralbyrån (2022), around 20% of Swedish adults with disabilities feel lonely most of the time, roughly 35% are unhappy with their life, and approximately 17% feel left out of society. The same study shows that these percentages are more than three times as large as for adults without disabilities. Despite their right to support, individuals with disabilities do not seem to participate in society on equal terms with others.

UN's tenth sustainable development goal aims to reduce inequality within and among countries. For example, targets 10.2 and 10.3 aim to promote inclusion of all, irrespective of, for example, disabilities, and ensure equal opportunity through promoting appropriate legislation, policies and action (*Goal 10 / Department of Economic and Social Affairs, n.d.*). Additionally, the eighth sustainable development goal highlights equal rights to decent work in target 8.5, including individuals with disabilities (*Goal 8 / Department of Economic and Social Affairs, n.d.*). The inequalities affecting people with disabilities are addressed on a global level, further emphasising the need for action.

In Sweden, individuals with certain disabilities have the right to take part of support and services to promote equality, quality of life and societal participation, according to 5 § in *Lag om stöd och service till vissa funktionsnedsatta* [LSS] (SFS 1993:387). The law covers individuals with an intellectual disability, autism, or other significant and permanent physical or mental disabilities not related to normal ageing. Services provided by LSS should improve opportunities for living independently for individuals covered by the law and address goals of accessibility, autonomy and societal participation. This includes supported group homes, which provide support measures for individuals with comprehensive care needs and daily activity centres (DAC), which offer daily activities for individuals who are not able to be in paid employment (Socialstyrelsen, 2024a). Both services employ staff to support the individuals with their specific needs. Activities at DACs can have a habilitative focus or be more production-oriented tasks. The participation at DAC is not a form of employment, and therefore, the purpose of the service is not to produce goods or services but to provide a meaningful occupation. The activities shall offer stimulation, development, meaning and a sense of community according to individual preferences (Socialstyrelsen, 2022).

Every individual covered by LSS has the right to an implementation plan, which is a plan for housing and DACs and how they should fulfil the individual's needs (Socialstyrelsen, 2024a). This plan should be a basis for what participants do as their daily activities, and how they should be supported to get a feeling of safety and enable personal development. All services of LSS should be based on respect for the individual's right to self-determination and integrity. The individual should, to the greatest extent possible, be given influence and co-determination over the support measures provided. All support measures are voluntary to receive, meaning that services covered by LSS can't be provided without consent from the individual.

But at the same time, there is an obligation to provide support and help with daily needs that can be hard to handle independently.

Cognitive Disabilities & Pedagogical Aid

Two common conditions diagnosed to people provided with support within LSS are autism and intellectual disability (5 § in *Lag om stöd och service till vissa funktionsnedsatta* [LSS] (SFS 1993:387). Autism is a neurodevelopmental condition characterised by a difference in thinking and perception, which makes it difficult to connect meaning to experiences (Slaughter, 2024). This often results in challenges when trying to understand relationships between ideas or events, making it harder to grasp what is expected or what is occurring in the surrounding environment. Many individuals with autism experience heightened levels of anxiety and may become easily upset, often triggered by environments that feel unpredictable or overwhelming. Difficulties in simultaneously processing the present situation and anticipating future events can negatively affect organisational skills. Additionally, the concept of time can be difficult to understand and, together with a difficulty in organising their behaviour, can lead to uncertainty about how or when to begin a task.

Intellectual disability is a neurodevelopmental condition characterised by significant limitations in both intellectual functioning and adaptive behaviour (Lee et al., 2025). Intellectual functioning, commonly referred to as intelligence, includes a broad range of mental abilities, for example, problem-solving, logical reasoning, learning capacity and verbal skills. It is often defined as the overall cognitive ability that enables an individual to understand and interact with the world. Adaptive behaviour includes three parts: competence in social skills (e.g., interpersonal skills and social responsibility), conceptual skills (e.g., understanding time and language) and practical skills (e.g., using tools and carrying out activities).

There is wide variation among people with cognitive disabilities, some being able to live relatively independently, while others have substantial support needs (Lee et al., 2025; Lord et al., 2018). It is not unusual for autism and intellectual disability to appear in combination, and it is also common together with other diagnoses.

Structured teaching, based in TEACCH (Treatment and Education of Autistic and related Communication-handicapped CHildren), is a method commonly used within LSS services to provide support (Socialstyrelsen, n.d.). It is a pedagogical approach designed to make the environment comprehensible and more suitable for individual needs for people with autism (Mesibov et al., 2004), but is also used to support people with intellectual disabilities (Siu et al., 2019). In this context, structure refers to the active organisation and direction of the physical environment and the sequence of activities (Mesibov et al., 2004). A key part of the method is that routines and activity sequences should be predictable, helping individuals to better understand their surroundings and minimising stress caused by uncertainty or unexpected changes. Visual schedules are a central tool in structured teaching, particularly useful in supporting transitions between activities. By establishing a habit of checking the visual schedule, individuals learn to anticipate what will happen next. Routines also play an important role in providing a strategy to understand and predict events happening in the surrounding environment.

Digitalisation

Nowadays, digital products are for most people a substantial part of everyday life. However, individuals with disabilities do not have the same opportunity to take part in this development. A study from 2020 shows that only 67% of young people with an intellectual disability own a mobile phone, compared to 98% of young people without disability (Aronsson, n.d.). The study concludes that the digital gap is established when young and lasts all life. This leads to digital exclusion, making it difficult to be a part of today's society. Introducing digital aids can be a way of supporting individuals in participating in digital development, making it easier to continue learning and implementing other digital products as well.

Boet

Välfärdsteknik Sverige AB provides a digital interface called Boet that supports activities in group homes for individuals with cognitive disabilities (Boet, n.d.). The company is driven by the vision of everyone being able to live their best lives and aims to contribute to increased equality and diversity, leading to a healthy society without discrimination. They suggest that digitalisation and the implementation of new technology can improve social sustainability as well as personal development.

With their product, Välfärdsteknik Sverige aims to provide a structured planning and work methodology for staff and thereby enable individualised and high-quality support to residents. The product includes a system of three separate interfaces (see Figure 1), the first being a web-based platform (A) that enables staff in group homes to plan and schedule individualised support measures for residents and divide responsibilities among staff. Residents can interact with their schedules and cognitive aids inspired by the structured teaching methodology for each activity through a mobile application (B). This application is designed to promote autonomy by providing structured guidance in daily activities. In addition, staff have access to a second mobile application (C) in which they can follow the schedules of the residents they are responsible for and see when and how to provide support.

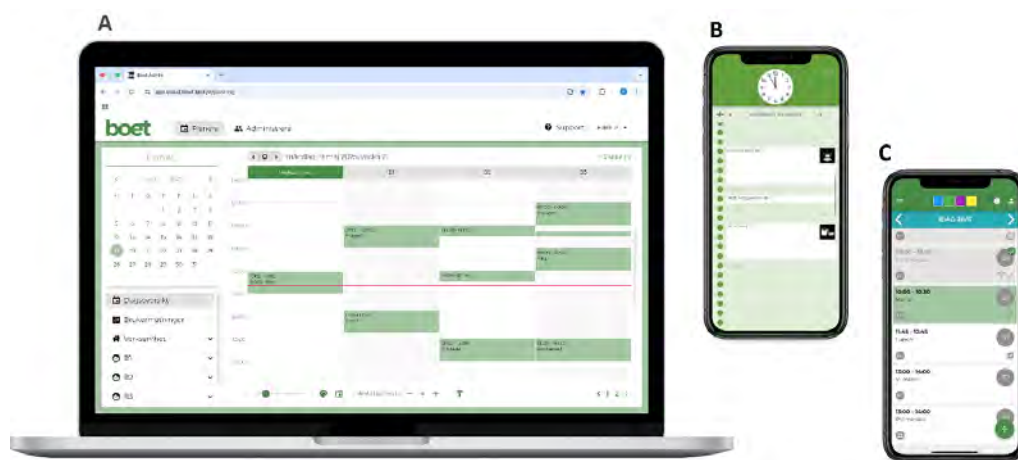


Figure 1. Screenshots from the Boet interface: (A) Web-based platform for schedule administration; (B) Residents' mobile application with individual schedule; and (C) Mobile application for staff members

The Boet team is now exploring the possibilities of expanding their product to fit the needs at DACs in addition to group homes. A few centres with the appropriate prerequisites have already begun implementing Boet; however, in its current form, it does not fully meet the needs of most DACs. A key challenge with such adaptation is that DACs generally have a significantly higher number of participants compared to the number of residents of a group home, sometimes reaching up to a hundred individuals. Additionally, DACs are organised differently from group homes, which presumably results in new needs that must be identified for a successful adaptation. This expansion would enable the implementation of digital tools in a broader context for people with cognitive disabilities. Offering digital aids not only at home but also in the work environment can help bridge the digital gap and create opportunities for a more inclusive society. This thesis will investigate the needs and requirements of DACs and will not address challenges that are specific to the use of a digital interface in group homes.

1.5 Aim

This thesis aims to examine how a digital interface can support daily work activities for individuals with cognitive disabilities in a way that promotes inclusion. This will be done by addressing the following questions:

- 1) Which activities and pedagogical tools at daily activity centres would benefit from digitalisation in a way that increases equality, quality of life and societal participation for individuals with cognitive disabilities?
- 2) How can a digital interface be designed to facilitate daily work activities, and increase equality, quality of life and societal participation for individuals with cognitive disabilities?

1.6 Objectives

To address the aim, a design-oriented approach will be used to:

- 1) Explore the context, challenges, and user needs for staff and participants in their practices at the DAC. This, to address research question one.
- 2) Develop design solutions for a digital interface that addresses the challenges and needs of staff and participants in their practices at the DAC. This, to address research question two.

1.7 Project Structure

The thesis project is divided into two phases: *Empathise & Define* and *Ideate & Design*. The first phase, *Empathise & Define*, addresses research question 1, and the second phase, *Ideate & Design*, addresses research question 2.

Empathise & Define

2. Process & Methods

To identify which activities and pedagogical tools at Daily Activity Centres (DACs) would benefit from digitalisation, the context, challenges and user needs of both staff and participants at DACs were explored. The process began with a pre-study (see Figure 2), during which the context was investigated through visits to both DACs and group homes. Next, user studies were conducted to gain deeper insights into specific topics. Ultimately, the insights were analysed and synthesised into design guidelines intended to support the development of design concepts in the next phase, *Ideate & Design*.

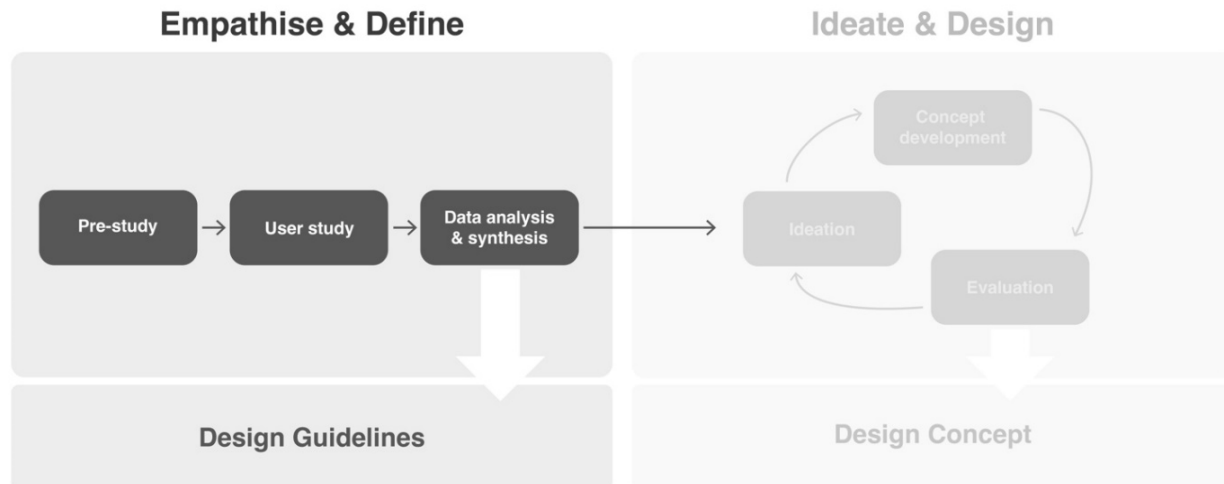


Figure 2. Illustration of the Empathise & Define process

Throughout the process, employees from Valfärdsteknik Sverige contributed with their knowledge about the user group, context and the current product, as well as how it is used. This included mainly software developers and organisation developers, employees who guide customers in how to best utilise Boet while also gathering feedback to improve the interface. To leverage their knowledge and gain insight into their vision for Boet, regular meetings were held throughout the process. Additionally, early in the project, a workshop was organised through a digital meeting using a virtual whiteboard for collaboration. The key questions explored during the workshop were: “*What is the impact goal of Boet?*”, “*What obstacles stand in the way of achieving this goal?*”, and “*Why do these obstacles arise?*”. The participating employees first reflected individually, adding sticky notes with their thoughts before engaging in group discussions.

2.1 Pre-study

The pre-study was conducted to develop an initial understanding of how DACs operate and what needs they have. The aim was to gain basic insights into which areas required further investigation and to inform the design of the user study. Four LSS facilities were visited, two group homes that are using Boet, and two DACs, of which one is using Boet, and one is not (see Table 1).

Table 1. *Facilities visited during pre-study*

Facility	Boet	Method	People Present
Daily Activity Centre 1	No	Semi-structured Interview	3 Staff members
Group Home 1	Yes	Unstructured Interview	2 Staff members, 2 residents
Group Home 2	Yes	Semi-structured Interview	1 Staff member
Daily Activity Centre 2	Yes	Semi-structured Interview	1 Staff member, 1 DAC Participant

During visits to group homes and DACs, semi-structured interviews were held with staff, and in most cases, a guided tour of the environment was provided. At two facilities, there were also interactions with participants. At DAC 2, an interview was conducted with one participant, and at Group Home 1, the interview included both staff and participants, resulting in a more unstructured format. During this interview, interactions between staff and participants, and their use of Boet, could be observed in addition to the interview itself.

The goal of the visits was to gain an understanding of user needs and organisational structure. This included the number of staff members and participants or residents, the structure of a typical day, and the overall organisational framework. Additionally, the process for planning activities, the division of responsibilities among staff, and the use of schedules and planning tools were examined. Consideration was also given to how unforeseen changes occur and are managed, as well as the challenges faced by the staff and participants/residents.

For facilities utilising Boet, further questions were explored regarding its purpose and integration into daily routines. Specific focus was placed on identifying who uses Boet, for what purposes, and how it supports their needs. The investigation also explored the perceived strengths and limitations of the Boet product system, along with any challenges encountered during its use.

2.2 User Study

To identify which activities or tools would benefit from digitalisation, it was first necessary to understand how current practices support participants' autonomy, routines and well-being. Based on the knowledge gained from the user study, the user study was designed to serve as a foundation for evaluating where and how digital tools could create a meaningful impact. To capture a complete picture of the context, needs and challenges, interviews were conducted with both DAC participants and staff members. The participant interviews aimed to explore their perspective on a meaningful work life, routines and receiving support. Staff were interviewed to investigate their attitudes toward digitalisation, overarching goals of

the organisations, and specific needs related to planning participant activities. The methods were chosen to capture reflections from the two user groups.

In total, five DACs in various parts of Sweden were included in this study (see Table 2). Of these, four have started to implement Boet in their organisation. Since the product Boet has been assessed as suitable for these DACs by the Boet team, they were assumed not to be the most critical potential users. Therefore, an additional DAC was included in the study, which does not use Boet and has a relatively high number of participants. The cognitive abilities of participants varied across the DACs visited. At DAC 4, participants received one-to-one support from staff, indicating higher support needs. In contrast, participants at DACs 2 and 3 required less support. At the larger DACs (1 and 5), cognitive abilities varied significantly among participants, reflecting a broader range of support needs.

Table 2. *Daily Activity Centres visited during the main user study*

Daily Activity Centre	Number of DAC participants	Use Boet	Method
Daily Activity Centre 1	31	No	Observation
Daily Activity Centre 2	10	Yes	Participant interviews Staff member interview
Daily Activity Centre 3	10	Yes	Participant interview Staff member interview
Daily Activity Centre 4	5	Yes	Participant interview Staff member interview
Daily Activity Centre 5	30	Yes	Online staff member interview

Observation

One observation was conducted at the DAC that does not use Boet. The goal of the observation was to experience the context of a DAC first-hand to get insights into the environment that the digital aid should support. It aimed to unveil day-to-day needs and challenges that might be difficult to express verbally for participants and staff in interviews. The observation was performed during a full workday, starting with a staff meeting. After the staff meeting, participants arrived, and a few staff members were shadowed to observe the nature of their work and how they provided support to participants. During the day, open questions regarding schedules, structure and support aids were discussed with both participants and staff members. Attitudes towards the use of technology were also brought up.

Participant Interviews

Since the ultimate goal of the design is to support and enhance the quality of life for DAC participants, it was essential to explore the topic from their perspective. The purpose of speaking with participants was to gain deeper insight into what these goals mean to them personally and how a scheduling application might help support them. At the three DACs using Boet, individual interviews were conducted with five participants at three different DACs to discuss their views on what constitutes a meaningful work life, as well as their experiences with structure and receiving support.

To do so, visual scales in three steps, inspired by the Talking Mats Framework (Murphy et al., 2005), were used (see Figure 3). The participants were asked to place cards with picture symbols on two separate visual scales. Each picture symbol represented one DAC-related activity, object or person (see Table 3). The scales were primarily used as mediating tools to encourage reflection and facilitate communication with participants. Therefore, precise placement on the scales was not emphasised.



Figure 3. One of two Visual scales with picture symbols

Table 3. Picture symbols for the two visual scales

Feeling bad, neutral or good	Perceived as difficult, neutral or easy
Participant-specific activities at DAC	Participant-specific activities at DAC
Using schedules	Using Schedules
Resting	Using Boet
Staff	Ask for help
DAC-friends	Keep track of time

In the first scale, they were asked to reflect on how they feel when they perform specific tasks at their DAC, with the options *Feel bad*, *Neutral*, and *Feel good*. To ensure that participants and interviewers shared a common understanding of the scales, the participants were first asked what they thought it meant to feel good or bad, and if needed, the interviewer filled in with examples of feeling proud or unsafe.

The picture symbols were then handed to the participants one by one to manage the pace and placed in silence. After all the pictures for one scale were placed, the participants were asked to review their placement and adjust if needed. With the complete scale in front of them, the interviewees were asked questions regarding their choices, for example, why they might feel a certain way in a specific situation and if any activity made them feel proud or unsafe.

The second scale treated which activities the participants perceive as *Difficult*, *Neutral* or *Easy*. Before being handed the pictures for this scale, they were asked to describe what they think it means that something is difficult, and the interviewer provided examples of needing help with a task. Similarly to the first scale, the follow-up questions addressed the participants' emotions regarding things that are difficult and their attitudes towards asking for help and receiving support.

Before conducting the interview, staff at the various centres were consulted to ensure that all participants felt comfortable. Information about the participants' individual communication needs were gathered as suggested by Cambridge & Forrester-Jones (2003). This was to enable the preparation and appropriate use of mediating tools, for example, picture symbols for the interview agenda or specific time-management aids. Additionally, staff were asked what activities the participants usually engage in to enable relevant picture symbols for the scales. Therefore, every participant had different activities to place, while the remaining symbols were the same for everyone.

Additionally, the staff were sent a consent form for the interviews to show the participants in advance as preparation. The form provided a concise description of the agenda and included consent to audio recording and photography during the interview. Picture symbols were used to support the written text and aid comprehension. The form was then discussed and signed at the start of each interview.

Inspired by (Cambridge & Forrester-Jones, 2003), the staff were also involved in the selection of participants in terms of them voicing which participants might be most suited based on how the participants might feel about an interview setting. The goal was to include participants with various levels of needs in the study and to interview two or more participants at each DAC. However, for two of the visits, only one participant was willing and able to participate in the study. In total, five participants were included in the study (see Table 4).

Table 4. *Interviewed participants*

Daily activity centre	Participant	Scales included in the interview	Duration
Daily activity centre 2	P1	Feeling bad, neutral or good Perceived as difficult, neutral or easy	30 min
Daily activity centre 2	P2	Feeling bad, neutral or good	30 min
Daily activity centre 2	P3	Feeling bad, neutral or good Perceived as difficult, neutral or easy	45 min
Daily activity centre 3	P4	Feeling bad, neutral or good Perceived as difficult, neutral or easy	30 min
Daily activity centre 4	P5	Feeling bad, neutral or good	15 min

The duration of the interviews varied between participants depending on how long they were able to sit down and focus. Therefore, some of the interviews addressed only one of the scales. In these cases, it was assessed most resourceful to focus on one scale to base the discussion on, since the focus was on discussion rather than the scale result.

Staff Member Interviews

The aim of the staff interviews was to get further insight into the challenges and needs in achieving organisational goals. These interviews, therefore, focused on asking about activities and needs in creating structure and meaningful engagement for both participants and staff.

At the beginning of each interview, the staff members were asked to elaborate on what values they wish that Boet brings to their organisation. This was asked to explore how staff relate digitalisation and schedules to their organisational goals.

To prompt discussions about the specific planning activities, the staff members were asked to create a timeline of their planning process. The type of planning process was open to interpretation by the interviewed staff members, but all chose to demonstrate how they plan the introduction of a new participant and their associated activities. Cards with common planning activities were provided to be placed to form a timeline, see Figure 4. These were meant to exemplify what type of actions were relevant to include and guide the interviewees in an otherwise rather open task. The staff members were also asked to add written information on the cards that specified the activities. Further, symbols of planning aids were

available to place next to an activity card to highlight potential tools that are used in that activity. Lastly, role labels such as *Participant*, *Staff member*, *Manager*, or *Other* were added to point out involved people in each activity. During the process, questions were asked to nudge further reflections on certain activities and their purpose.

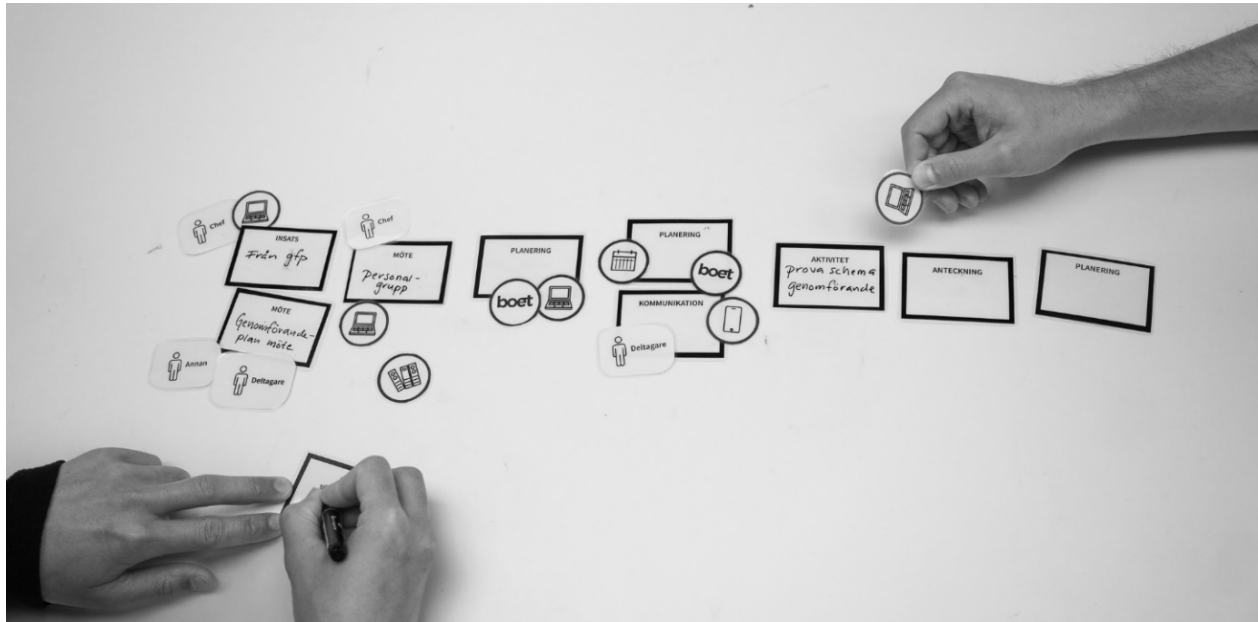


Figure 4. Timeline created during staff interviews

This method was designed to encourage detailed reflections of important steps in planning, but also to gain extensive knowledge of the organisational structure at each DAC. This information was sought to uncover similarities and differences between the methodologies at different DACs, which affect how a scheduling application should be designed. The method also aimed to create a natural structure for the interviews, where questions could be asked targeting specific parts of the timeline. Elaboration was especially encouraged on how, when and by whom participant schedules were created, what factors affect the schedules, and how participants are involved in the process. The staff members were also asked how they address unpredictable changes and how frequently they need to adjust the plan. Additionally, staff responsibility was discussed in terms of how and when it is allocated, why it is done a certain way and what factors affect the allocation.

Each interview ended with asking the interviewees how their organisation addresses participant autonomy, influence and integrity to further investigate how the goals of LSS are practically employed.

Based on the aim of the interviews and the questions prepared, at least one staff member with insights into the day-to-day work and extensive involvement in planning schedules at each DAC was asked to participate in an interview. Managers were invited to join the interview as well to contribute their perspective. This led to three of the interviews, including both staff and managers (see Table 5). One of the interviews was held online, which meant that the timeline activity was omitted and replaced with corresponding, additional questions.

Table 5. *Interviewed staff members*

Daily activity centre	Number of staff members present	Method	Duration
Daily activity centre 2	1	Timeline interview	60 min
Daily activity centre 3	2	Timeline interview	60 min
Daily activity centre 4	4	Timeline interview	60 min
Daily activity centre 5	2	Video call interview	60 min

2.3 Data Analysis and Synthesis

The interviews from the user study were analysed using thematic analysis as described by Braun and Clarke (2006). Audio-recorded interviews were transcribed, and the material was read through to gain a deeper understanding of the data and identify interesting aspects. Once familiar with the content, the interviews were reviewed, and relevant segments were highlighted as codes and categorised into themes. After coding all interviews, the themes were refined by reorganising codes, splitting or merging themes as needed, and adjusting their titles to ensure they accurately reflected the data they represent.

Based on the identified themes, various problems and user needs were defined, and a list of design guidelines was developed. The list was created to gather and communicate the essential goals a digital interface must meet to effectively support DACs, with each guideline addressing key insights from the user studies. All guidelines included in the list are considered relevant. However, to indicate which are the most urgent to address, each guideline was assessed in terms of its importance for a digital system's effectiveness at a DAC. The rating system ranges from 1 to 3, where 3 represents the highest importance, and was informed by the number of users mentioning it as well as how relevant they perceived the topic to be. Rather than representing strict importance levels, the scale guides how the design should respond to each guideline.

- 1** The product system should avoid conflicting with this guideline.
- 2** The product system should include strategies to meet this guideline.
- 3** The product system must include clear and explicit strategies to fulfil this guideline.

To further identify guidelines that were especially urgent to address, the existing Boet interface was evaluated based on how well it meets each guideline. The compliance rating uses the following symbol system:

✓ The guideline is sufficiently met.

! The guideline is partially met.

X The guideline is not met at all.

3. Insights and Implications for Digitalisation

This chapter will present the insights gathered during the pre-study, user study, and conversations with the Boet team. First, insights from the user studies will be introduced. Secondly, the design guidelines and their assessment will be presented and motivated to lastly present final thoughts on prioritisation of the design guidelines.

3.1 Insights from the User Study

The user studies resulted in a wide range of insights into topics related to the DAC context, attitudes, and needs. This chapter presents the findings grouped into themes that highlight the central insights: *the Daily Activity Centre Context, Developing Participant Schedules, the Need for Flexibility, Supporting Participants, Meaningfulness and Personal Growth, the Importance of Structure, and Supporting Staff in Their Tasks.*

The Daily Activity Centre Context

The context of DACs can differ considerably depending on the participating individuals and the organisation's governing body, whether it's public or privately owned. There are, however, some common qualities that many DACs share, which differentiate their needs from group homes. Group homes typically accommodate between five and ten residents, while DACs often serve up to forty participants, and in some cases, up to one hundred. This makes the administration of DAC activities more complex than group homes. Another difference between the two settings is the level of support needed by the individuals taking part in the service. DAC participants include a broader user group with both individuals living in group homes and those living more independently, with lower support needs. Group homes focus more on care and assistance compared to DACs. DACs emphasise work-like activities, and many participants do not need the same care-related support in that setting.

While group homes support residents in their personal routines, participants come to DACs for occupation, which is provided through activities. The nature of these activities can vary greatly depending on the participants' cognitive capacity. For individuals with limited cognitive ability, it is common to offer sensory-based activities that allow for engagement through gentle stimuli such as light, sound, or touch. It is also common to offer activities that align with each participant's interests. During the user studies, activities such as puzzling, drawing, baking or knitting were observed. All DACs visited provided some kind of creative activities, and in some cases, the creations were sold in a shop where participants could engage in sales. DACs with participants who have a higher degree of cognitive ability may offer tasks that resemble those in regular workplaces. These can include activities such as washing clothes for elderly homes, operating a café within the DAC, delivering mail, or managing waste.

Moreover, it is common that DACs offer participants to engage in group activities and activities that are planned in collaboration with other DACs or participant groups. In contrast to strictly individual activities, these require slightly more coordination of different schedules, both in terms of participants, location and

staff. In the current interface of Boet, activities are connected to one specific individual. This entails that to plan a group activity, all information must be manually added for each participant. This is something that several of the staff members expressed as time-consuming and inconvenient during interviews.

It is also common for DACs to include activities that are not tied to a specific time. These may include tasks that can be completed at any point during the day, such as taking out the trash, or activities that depend on events with unpredictable timing, such as accepting an incoming delivery. Similarly, opportunities for some activities might show up spontaneously, e.g. an extra spot becoming available in a group activity. Currently, Boet requires all activities to be scheduled within a specific time slot. Staff at several DACs identified this as a problem, as it forces them to assign timeframes that are often inaccurate. As a result, these activities are left out of the schedule entirely, or the information presented to participants is unreliable or false. This ultimately leads to the participants' schedules lacking clarity and structure. Some DACs also undertake responsibilities from other parties, such as laundry or recycling, which the organisation is obligated to complete. This entails that if the assigned participant isn't able or willing to complete the task, staff must step in. Either by reallocating it or by informing those who depend on its completion.

Staff are employed at DACs to support participants in engaging with daily activities, and the number of staff present is determined based on the participants' individual support needs. The staff-to-participant ratio varies widely between centres and could range from one staff member per participant to one staff member per ten participants. Although staff responsibility is organised differently across DACs, it is often the case that staff are assigned to a group of participants or specific activities in designated areas of the centre for a day.

Developing Participant Schedules

The timeline activity conducted with staff members during the user studies generated three timelines over how each DAC plan their participants' schedules. The activities that were mentioned in all three interviews are compiled in the generic process presented in Figure 5.

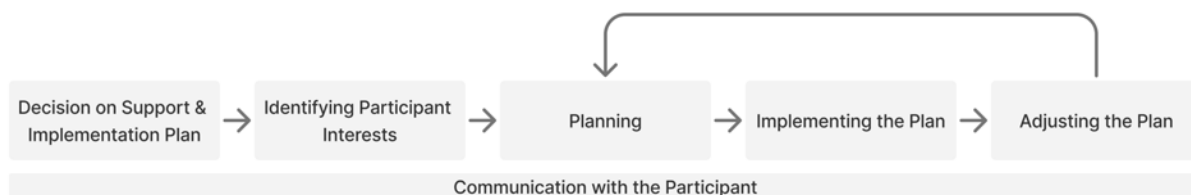


Figure 5. A generic process for developing participant schedules at DACs

Decision on Support & Implementation Plan

When a decision is made for an individual to begin attending a DAC, an implementation plan is typically developed by the individual and their LSS Case Officer. This plan outlines the individual's goals and describes the support they should receive at DAC to help achieve the goals.

Identifying Participant Interests

By reviewing the implementation plan and communicating with the participant, staff can identify interests and preferences. It is also common for participants to be given the opportunity to try out various tasks and activities for a period of time, helping them discover what they enjoy doing. While the intent of identifying interests is the same, the exact strategy might vary between DACs.

Planning

Based on the implementation plan and interests, the staff plan the participant's activities and tasks at DAC. They also determine how support will be provided during these activities. The plan includes the participant's schedule for which days they will attend and for how long. The level of details included in the plan varies notably depending on both the individual's need for structure and clarity, as well as the organisation's routines. The plan can therefore range from including minute-by-minute schedules and instructions on how the individual should be supported in each activity, to a list of interests and general guidelines on support preferences.

Implementing the Plan

Once the plan is in place, the participant begins attending the DAC according to the schedule. During this period, potential issues may arise. These can be minor, such as needing to adjust the timing of an activity, or more significant, such as the participant struggling with a task and requiring different support. Participants are also able to share their own feedback about the plan and schedule.

Adjusting the Plan

Minor changes can be made right away, such as the time of an activity, while more substantial adjustments are discussed in staff meetings and then implemented. There are both daily meetings addressing urgent matters as well as monthly meetings taking more time to focus on individual participants. When an adjustment is made, the participant continues to attend DAC with the new plan, in a continuous process. The plan is not only reviewed and adjusted to fix problems, but also to promote personal development for the participant and make sure that their activities are found meaningful for them, as mentioned earlier, keeping a balance between comfort and challenge.

Communication

Throughout the entire planning process, staff maintain regular communication with participants through both everyday interactions and structured meetings. Some participants have legal guardians who are also involved in this dialogue. In addition, some participants use visual supports, such as pictogram images, to aid understanding and communication. Supporting participant influence is a key priority mentioned by several staff members during the interviews. This includes respecting the participants' wishes whenever possible, through enabling their influence over the schedule and the activities it entails and respecting their right to resist activities.

The Need for Flexibility

All services provided within the LSS are voluntary. This is especially evident at DACs where participants have the freedom to choose whether to show up at DAC or attend specific activities on a daily basis. If participants are unable or unwilling to engage in an activity, staff are expected to use pedagogical strategies to encourage participation. However, in many cases, the activity is cancelled and the original plan adjusted to accommodate the participant's wishes. The increased freedom of choice for participants in combination with the occurrence of activities not tied to specific times, makes the environment at DACs more dynamic than at group homes. This creates a need for greater flexibility and frequent adjustments to schedules.

Another example of this is that staff availability can be unpredictable. Ideally, a substitute can step in and the plan continues as intended. However, it is common that the schedule needs to be revised if there are too few staff members available. Some participants require the presence of familiar staff, which may necessitate further changes in staff responsibility when substitutes are present. All DACs participating in this study have a meeting every morning, adjusting the plan to fit the daily prerequisites. Throughout the day, additional changes might have to be managed due to unplanned events. Currently, schedule edits in Boet can only be made via a computer using the admin interface. If staff don't have quick access to a computer, they may leave the schedule uncorrected, resulting in inaccurate information being shown to participants.

Supporting Participants

Since providing support for participants is the goal of a DAC, and Boet should facilitate that, it is important to understand what support entails. Often, it includes supporting participants in managing work tasks independently. However, every participant needs help with different things and in different ways; therefore, the support provided should be tailored to the needs of the individual receiving it. During the user studies, this has often been referred to as *individualised support* and is one of the core values of both the LSS law and Boet. How participants view their own need for support has varied in the study. Some participants seemed highly aware of both what they need support in and how they prefer to receive it. As an example, one participant explained how they have trouble sensing when they need a break and would therefore like to be reminded now and then. Other participants seemed to have a harder time identifying what they usually need support with, or what they perceive as difficult. In these cases, staff need to identify what support suits the individual based on behavioural cues. During interviews, staff members have talked about how some participants seem to get stressed if pressure is put on them to finish a task or if they are presented with a lot of information. Noticing and acting on these cues are often seen as silent knowledge or a trained instinct. A common challenge in LSS organisations is that much of the critical knowledge is held informally by a few experienced staff members, as silent knowledge. This means that the quality of support could vary significantly depending on which staff member is present and what knowledge they possess. Documenting the expertise and knowledge and making it accessible for all staff enables establishing a common approach to provide consistency in the support provided. Many of the interviewed staff members mentioned this as one of the most central motives for using a digital planning aid at their

organisation. One staff member emphasised this and explained that it is crucial to create emotional security and clarity. Implementing structured methods for capturing knowledge on how to support participants can lead to a sense of safety and trust among staff and those receiving support.

Additionally, many participants require support in communicating their wants and needs. This is often facilitated through aids such as picture symbols or other visual tools. Providing communication support in a digital aid is important to ensure that participants can both understand and actively influence their work. Ideally, a digital aid would help participants express their needs, support staff in interpreting those needs, and guide how to respond appropriately. The interface should be customizable to suit different needs regarding both the presentation and the amount of information.

In general, the digital aid should support all participants in executive functions such as engaging in activities, transitions between activities and time management. Difficulties in these areas are common among DAC participants and are significant factors in their ability to manage daily work tasks. This is also one of the main needs targeted in the current interface, since it is designed as a scheduling application. Schedules are commonly used in LSS organisations as tools to aid participants in organising and finishing tasks.

Meaningfulness & Personal Growth

In many of the staff interviews, the theme of meaningfulness emerged as a central topic. Attending a DAC should be a meaningful experience for participants, and what is meaningful can vary widely and include several aspects. For some, it involves engaging in tasks that have value for others, like the responsibilities of a regular job. For others, simply participating in something enjoyable can provide a sense of meaning.

Personal development is another key aspect of meaningfulness, and all DACs work with individual participants' goals. Multiple participants themselves expressed pride and joy in developing skills and being good at the tasks they do. To support personal growth for participants, many DACs actively work to support participants in becoming more independent in their work activities. One centre mentioned that Boet plays a crucial role in helping them achieve this since it makes participants less dependent on staff members to complete tasks. To ensure that activities remain meaningful and to promote ongoing personal development, each participant's schedule must be regularly reviewed and adapted to their evolving needs and interests, while keeping a balance between familiar and challenging activities.

The Importance of Structure

Providing consistent and high-quality support at DACs requires structure. In conversations with employees at Valfärdsteknik Sverige, encouraging organisations to maintain a structured work methodology has been described as a core objective. A clear structure for individuals' participation at DACs creates a stable and predictable environment for both staff and participants. For staff, structure can clarify information on how, when and where to support participants. This is particularly important for substitutes and new staff who

are not yet familiar with the organisation's working methods and was emphasised by staff in several interviews. In addition to practical support from the structure, it can instil confidence and a sense of calm amongst staff, which improves the quality of the support they provide.

For participants, a structured approach contributes to a sense of security by allowing them to rely on a stable plan and trust the information they receive. It also helps clarify expectations, both in terms of what they can anticipate during their day and what is expected of them, which further supports emotional well-being. One staff member described how some participants get anxious and restless when the structure is messy, and they don't have clear instructions on what to do. Another staff member talked about how their participants' well-being is dependent on a consistent structure. Furthermore, participants themselves expressed appreciation for having a schedule and receiving guidance on what to do during interviews. However, the level of desired structure varies. Some participants want to know the exact time for every activity during the day, while others are comfortable not knowing details in advance. For some, strict routines contribute to a sense of well-being, whereas others find it exciting when plans change. Regardless, the user study results indicate that a structured work methodology is essential to achieve goals and develop over time. Organisations lacking structure can tend to lose track of goals, and staff might act on what they find comfortable rather than beneficial for participants.

The administrative work of planning individual participant schedules is time-consuming, which is a common reason for not working in a structured manner. DAC environments are often dynamic, where unpredictable events may force a change of plans. In the user studies, staff have argued that this makes it redundant to create detailed plans, as it might not even be followed. At several of the DACs in the study, managers and staff held differing views on planning. While managers envisioned highly structured and detailed plans, staff often felt these expectations were unrealistic given the dynamic nature of day-to-day work.

Because of this, it is important that the interface is easy to use and that administrative tasks don't take longer than necessary to make time for things that create value for participants. The technical proficiency was found to be generally low among both participants and staff at DAC, increasing the need for an intuitive and efficient interface. With an increased number of participants, the administrative tasks can take even longer time, making usability even more important.

Shifting Working Methods

A common challenge at DACs is participants getting attached to specific staff members. This can cause friction between participants and other staff members, or strong emotional reactions when the specific staff member isn't available for the participant. Usually, the attachment is an effect of staff members' varying knowledge of how to best provide support for the individual. This often leads to staff being allocated responsibility for the participants they have the most knowledge of. Out of convenience, the same staff consistently end up working with the same participants and an attachment is fostered. Although this strategy provides short-term advantages such as consistent support and emotional security for participants, it can lead to a downward spiral of uneven staff competencies and limited flexibility. One way

to address this issue is to actively rotate which staff members support each participant, while also working to shift the source of emotional security from individual staff to more stable and lasting structures.

Employees at Valfärdsteknik Sverige have expressed a desire for Boet to not only support organisations within LSS but also to challenge existing attitudes and working methods to foster a more participant-centred mindset. A common risk within these organisations is that staff may make decisions based on their convenience rather than what is best for the participant. This mindset is often not a conscious choice, but rather a reflection of the organisation's ingrained culture. While rarely driven by bad intentions, such attitudes can still negatively impact participants. For example, when the same staff member repeatedly assumes responsibility for a particular individual. Boet seeks to shift this dynamic by promoting, and at times forcing, working methods that put the participant's needs and interests first. This involves, for instance, creating personalised plans for each participant as a starting point, and only then organising staff tasks around the participants' schedules. It also includes efforts to reduce last-minute changes that can disrupt participants' expectations and routines.

3.2 Design Guidelines

The design guidelines created address several different layers of abstraction, from general organisational goals to user interaction goals. The model in Figure 6 demonstrates the relation between the guideline layers and themes, which are reflected in the list as categories. This chapter will present the guidelines category by category and their assessed importance and Boet compliance, the assessment criteria can be found in chapter 2.3. For the full list, including comments, see Appendix A.



Figure 6. Model of the relationships between guideline layers and themes

Organisational Goals

The outer layer of organisational goals includes guidelines that reflect overarching goals of DAC organisations that were commonly brought up during interviews. These include: *Promoting a meaningful work life*, *Facilitating personal growth*, *Supporting participants in increased independence*, and *Promoting participant influence* (see Table 6). These guidelines are included in the list because the goals are assessed as both relevant and important to address in a digital aid to support the organisation as a whole. However, since the guideline refers to goals of a larger system, the Boet product system should not be expected to fully achieve these goals on its own, but rather to align with and support them.

Table 6. Guidelines under category Organisational Goals

1	Organisational Goals	Importance
1.1	Promote a meaningful work life	1
1.2	Facilitate personal growth for participants	2
1.3	Support participant in feeling and being independent	3
1.4	Promote participant influence	2

For these guidelines, their importance is assessed mostly based on a digital scheduling aid's presumed ability to support the corresponding goals. Since most of the interviewees claimed that they hope Boet will enhance the participants' sense of independence and autonomy at work, this is assessed to be very important. Although a meaningful work life was commonly mentioned as an organisational goal in the study, a digital aid has limited influence over this as a sole actor. Therefore, it is given lower priority. Lastly, the guidelines under this category are assessed in terms of current fulfilment since they are too broad to assess based on the data collected in the user study.

System Goals

The guidelines falling under the category of system goals outline the overarching objectives that a new digital scheduling aid at DACs should fulfil (see Table 7). In this context, system refers to the digital solution of one or several interfaces. These guidelines are more specific than the organisational goals, but they are not separated from them. Instead, the system goals should be regarded as a means to achieve the organisational goals, as demonstrated by the model in Figure 6. While both categories of guidelines are intended to inform the design of Boet, those under *system goals* should be addressed more directly and explicitly in the design process.

Table 7. Guidelines under category System Goals

2	System Goals	Importance	Boet Compliance
2.1	Support the planning of activities at daily activity centres	3	!
2.2	Facilitate a structured work methodology	3	!

2.3	Clearly communicate when, where, and how participants should engage in an activity.	3	!
2.4	Support daily activity centres in providing all participants with the support they need	3	!
2.5	Facilitate and encourage a participant-centred mindset in planning	3	!
2.6	Facilitate professional and trustful relationships between staff and participants	2	!
2.7	Enable purposeful usage by participants with various levels of support needs	3	!

All except one of the guidelines under system goals were assessed at the highest importance level due to their central role in supporting DACs. Facilitating professional and trustful relationships between staff and participants is given the weight of 2 since this goal is highly reliant on the social interactions between participants and staff. Therefore, Boet will have an uncertain influence over the goal. In the current Boet product, there are strategies to meet all these guidelines. However, these strategies lack effectiveness in DACs due to the contextual differences between DACs and group homes presented in chapter 3.1.

To further define the system goals, four additional categories of design guidelines have been included in the list: Participant Support, Planning, Staff Responsibilities, and Communication. These categories highlight key areas that require attention in order to effectively achieve the system goals.

Participant Support

The guidelines under Participant Support are targeting measures both related to direct support and emotional security (see Table 8). Direct support refers to how a digital aid should provide practical support to the participants in their daily work activities, while emotional security refers to providing a stable and consistent work environment for participants.

Table 8. *Guidelines under the category Participant Support*

3 Participant Support		Importance	Boet Compliance
Direct support			
3.1	Support participant with executive abilities	3	!
3.2	Support participant in managing work/rest balance	1	!

3.3	Support participant with time management	3	✓
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Structure & emotional security

3.4	Facilitate consistent support for participants	3	!
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3.5	Support participant in understanding and accepting schedule changes	2	X
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3.6	Facilitate mental preparation of workday for participant	1	!
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3.7	Communicate to participants who to turn to for support	1	X
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The guidelines with the highest weight are the ones most mentioned in the user study and considered most important by employees at Valfärdsteknik Sverige, according to their values. The guidelines with little to no fulfilment in the current product are aspects that haven't been actively considered in the current design, but are worth considering in further development.

Planning

The category Planning contains all guidelines that relate to how Boet should support DACs specifically in planning participant and organisational activities, and includes the subcategories: *Large number of participants*, *Context specific factors*, *Dynamic environment*, and *Evaluation & development* (see Table 9). Every category corresponds to a specific planning-related challenge in DACs. The larger number of participants in DACs in relation to group homes entails higher demands on efficiency and information management in a digital tool due to increased visual impressions and time-consuming administrative tasks. Efficiency in this context refers to supporting staff in planning for high-quality support with minimal time consumption. The guidelines under Context-specific factors address the contextual differences between group homes and DACs and the needs deriving from those differences. One of the most discussed differences is the dynamic environments that DACs often have, and the flexible planning approach that results in. The guidelines addressing these needs target areas that are especially important in order to achieve a structured work methodology in a dynamic context and are gathered under a separate subcategory. Lastly, one guideline attending to the evaluation and development of the plan is included to address the need to continuously work towards each individual's developing interests and goals.

Table 9. Guidelines under the category Planning

4 Planning	Importance	Boet Compliance
Large number of participants		
4.1 Enable efficient planning and scheduling of the organisation's activities	3	X
4.2 Present a relevant and manageable amount of information	3	X
4.3 Facilitate coordination of participant schedules	3	X
4.4 Enable distinction of participants	2	!
Context-specific factors		
4.5 Support activities without a specified timeframe	3	X
4.6 Support management of mandatory tasks	2	X
4.7 Support consideration of available resources	2	X
4.8 Support efficient planning of group activities	3	!
4.9 Support planning of activities with external parties	1	!
Dynamic Environment		
4.1 Support staff in making situation-based adjustments to plan	2	X
4.11 Support staff in prioritising activities based on participant need	1	X
4.12 Promote correct information in schedule	3	!
4.13 Enable shifting the responsibility of a task between participants	2	!
Evaluation & development		
4.14 Promote continuous development of participant plan	2	X

Most of the guidelines under Planning are assessed not to be fulfilled by the current Boet interface. This demonstrates a clear need for adjustments in how Boet presents and manages scheduling to effectively support the needs at DACs. This is further highlighted as many of the guidelines are of high importance to the users.

Staff Responsibilities

Staff Responsibilities include guidelines for allocating responsibilities and for supporting staff in their tasks (see Table 10). It should be noted that supporting task allocation amongst staff should focus primarily on guiding staff to divide responsibilities based on what is best for the participants, in a way that is intuitive and efficient.

Table 10. Guidelines under the category Staff Responsibilities

5 Staff Responsibilities		Importance	Boet Compliance
Allocate responsibility			
5.1	Support (responsible) division of responsibility for staff	3	!
5.2	Encourage rotation of responsibilities	2	!
5.3	Enable situation-based adaptations of staff responsibilities	2	✓
Staff Support			
5.4	Clearly communicate each staff member's individual tasks and responsibilities	3	!
5.5	Communicate to staff whether other responsibilities have been addressed or still require attention	2	!
5.6	Support staff in knowing when participants need support	3	!
5.7	Support staff in how to support participants	3	✓

All guidelines for staff responsibility are in some way accounted for in the current interface of Boet. However, there are clear points for improvement in making it more intuitive and efficient.

Communication

The final category of design guidelines addresses needs related to communication, both between participants and staff and between participants and external parties (see Table 11). While these guidelines aim to support social relationships that cannot rely solely on a digital interface, they are not necessarily essential for Boet to fully satisfy. However, they reflect important and relevant needs within DACs and are therefore included to be considered during the design of the interface

Table 11. *Guidelines under the category Communication*

6	Communication	Importance	Boet Compliance
6.1	Facilitate participants' communication about work with external parties	1	X
6.2	Facilitate communication between participants and staff	1	!
6.3	Support staff in interpreting the state/prerequisites of the participants	1	!

3.3 Prioritisation of Design Guidelines

The full set of design guidelines provides direction on how to create a digital tool that responds to the needs and challenges identified in the user studies, including activities and pedagogical tools that would benefit from digitalisation. While all guidelines represent important measures to support DACs, the assessment of their importance and Boet's current level of compliance helps identify areas with high potential for improvement. Therefore, this can inform decisions on which needs and challenges to prioritise for the design of a new interface.

Based on this evaluation, five guidelines are selected to guide the development of new design solutions in the next phase (see Table 12). Guidelines 4.1–4.3 and 4.5 are prioritised due to their high relevance to DACs and their limited representation in the current Boet interface. Guideline 4.8 is included due to its close connection to the other selected guidelines. While these five will act as the primary focus, related guidelines in the Planning category should be considered to support alignment across related solution areas. In addition, guidelines related to Organisational and System goals should be considered as reference points to maintain alignment with broader objectives. This selection lays the foundation for the design work in the upcoming Ideate & Design phase.

Table 12. *Design guidelines selected to be in focus in the next phase, Ideate & Design*

Prioritised Design Guidelines		Importance	Boet Compliance
4.1	Enable efficient administration of schedule	3	X
4.2	Present relevant and manageable amount of information	3	X
4.3	Facilitate coordination of participant schedules	3	X
4.5	Support activities without a specified timeframe	3	X
4.8	Support efficient planning of group activities	3	!

Ideate & Design

4. Process & Methods

The second phase aimed to examine how a digital interface could be designed to facilitate daily work activities based on the insights gathered in the previous phase. To do so, an iterative process was employed to investigate design solutions and assess their potential to meet the design guidelines (see Figure 7). Each iteration aimed to develop, evaluate and further refine ideas that ultimately form a proposed design concept for a digital interface supporting DACs. This chapter presents the process, including design approach, Ideation methods, and evaluation methods.

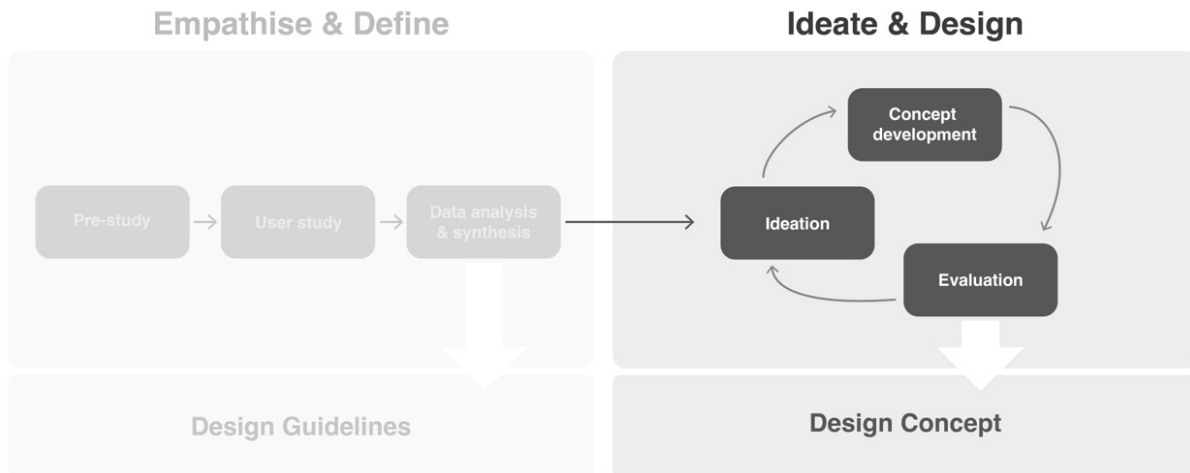


Figure 7. Illustration of the Ideate and Design process

4.1 Design Approach

To start the exploration of potential design solutions, an initial phase of ideation was employed. When the design guidelines were discussed with the developers of Boet, it was clear that the new product system might have to deviate substantially from the current interface to address the needs of DACs. Therefore, emphasis was put on brainstorming open ideas that challenge how the current Boet interface is designed. Initially, the focus of the sessions varied. Some aimed to address the prioritised guidelines, while others explored potential designs for core interface components in an administrative tool, such as a schedule overview. Some of the early ideas are presented in Figure 8.

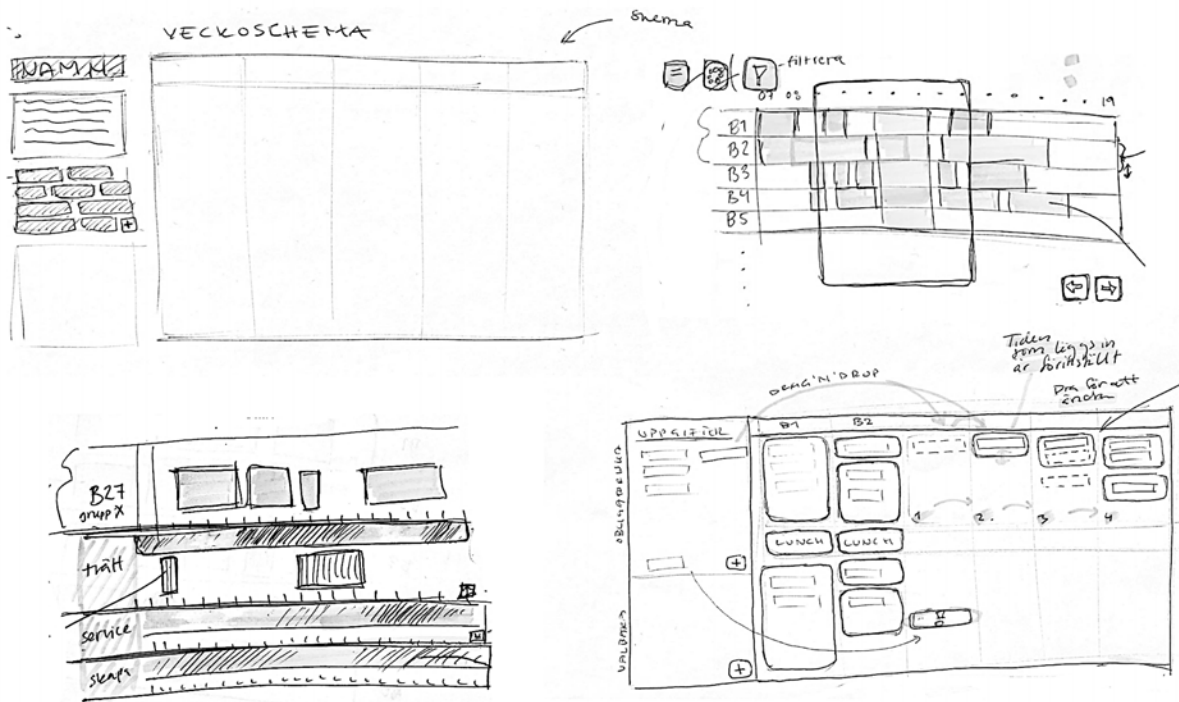


Figure 8. Examples of early ideas

It soon became clear that designing the foundational layout and components was the most natural starting point, providing a base on which more specific functionalities could later be built. Eventually, ideas formed a variety of early concepts that were combined into wireframes. These included ideas of schedule overview layouts and scheduling filters, individual participant profiles with schedule comparison views, and the incorporation of tasks without a specified time frame (see Figure 9). Additionally, a few standalone ideas were kept in the process. These included ideas on how drag-and-drop principles could be used to make schedule editing more efficient, and how schedules could be grouped to save visual space.

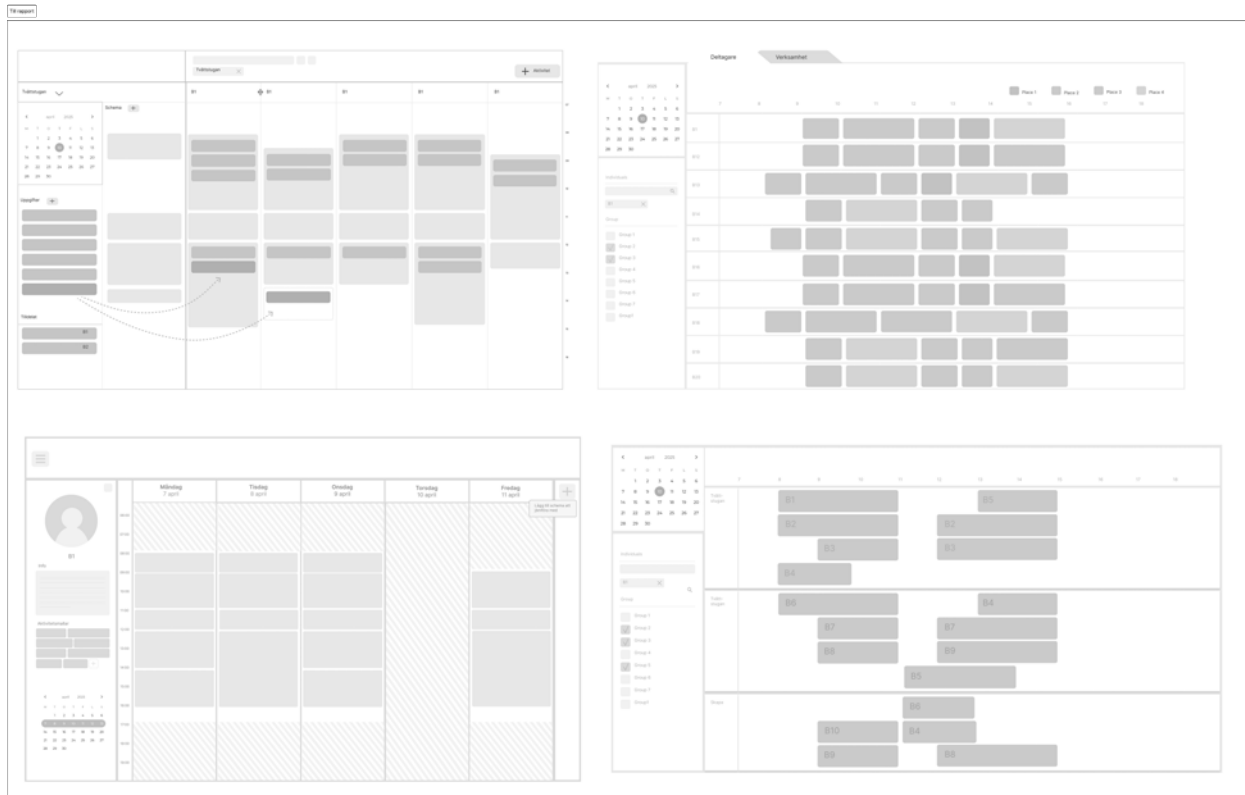


Figure 9. Examples of wireframes from the first wireframe concepts

After discussing the concepts with the Boet team, the concepts were developed to incorporate new ideas that emerged from the feedback received. In this iteration of concept development, the separate concepts were merged into one concept with variations for specific functions. For example, two sub-concepts for interaction flows and visual representation of tasks without a specified timeframe were created. This specific feature was thoroughly discussed with Boet and was therefore especially relevant to further evaluate in a comparative manner to investigate it from different perspectives.

Before conducting user evaluations, some concepts and ideas were discarded. This, to enable more elaborate consideration of the functions most vital for an early adoption of a product. The decision was based both on which ideas best addressed the prioritised guidelines and on the feedback received from Boet, due to their extensive knowledge of the user group.

The last step in the process included exploring users' reactions and thoughts on the created concepts through user evaluations. These were reviewed and summarised to inform further development of the design of a digital interface supporting DACs. Finally, to communicate the created design and its potential to the stakeholders, a visually refined version of the concept was created.

4.2 Ideation Methods

To initiate the ideation phase, a collaborative workshop was held with software developers and organisation developers from Valfärdsteknik Sverige. The session combined individual brainstorming around two predefined themes with group discussions focused on developing, combining, and refining ideas (see Figure 10). The themes addressed on non-time-specific activities and group activities were introduced through scenarios and open-ended questions to provide context while encouraging creative interpretation and unique solutions. After the workshop, the ideation process continued with creative methods such as Brainwriting, Braindrawing, Analogies, Brainstorming and Speedstorming (Wikberg Nisson et al., 2015). This phase focused on generating a large quantity of ideas that push the boundaries of what the interface looks like today. Selected ideas were further developed into more concrete concepts, initially visualised as analogue wireframes and later refined digitally using Figma. For developing concepts in further iterations, ideas emerged mostly from internal discussions and sketching based on evaluation results.



Figure 10. Ideation workshop with the Boet team

4.3 Concept Evaluation Methods

The initial evaluation phase was conducted with employees at Valfärdsteknik Sverige, where wireframes were presented, and feedback was collected. This first evaluation aimed to align ideas with the company's values and make use of their comprehensive knowledge of the user group. Especially to identify risks of misuse or user errors within the interface that may result in adverse effects for participants. Based on this input, some ideas were discarded while others were refined and merged for further development.

A second evaluation was carried out with staff members at three of the DACs participating in the user study (see Table 13). These were selected because their contextual challenges aligned with those targeted

by the design concepts evaluated, such as having many participants and mainly practising activities without specific timeframes. The evaluations were held on video calls. During the session, users were guided through the interface and asked to share their thoughts on its design, as well as how well they felt it would address the needs of their DAC and support their planning process. The evaluation included a mix of open-ended questions aiming to capture general thoughts as well as more targeted questions focused on the strengths and weaknesses of specific functions. Additionally, some questions were aimed at capturing additional insights related to the concepts that had not emerged during the initial user studies.

Table 13. *Daily activity centres participating in the evaluation*

Daily activity centre	Number of staff present	Use Boet	Total number of participants
Daily activity centre 1	2	No	31
Daily activity centre 3	3	Yes	10
Daily activity centre 5	1	Yes	30

In addition to the user evaluation, a heuristic evaluation was conducted based on Nielsen’s 10 usability heuristics (Nielsen, 1994). Each heuristic was individually assessed across different parts of the concept to determine how well the design aligned with established usability principles. Strengths and weaknesses were identified for each area. The findings were summarised in a comparative table, providing an overview of the different concepts and offering insights into areas for improvement as well as the strengths and limitations of each.

5. Design Solution

In this chapter, the evaluated design concept will be presented in relation to the targeted guidelines and the results from the evaluations conducted. It is important to note that the presented wireframes are not meant to represent a market-ready product but showcase specific solutions addressing key needs identified in the user study.

5.1 Schedule Overview

The solution is a web-based interface intended for staff to use when planning the participants' practices at the DAC. It is intended to be part of a product system together with two different mobile applications, one for staff and one for participants. The design is based on two main views, one overview of participant and organisation schedules, and one for weekly schedule overviews for each participant. Organisation schedules, under the tab *Verksamhet*, are meant to include activities or chores meant for staff, such as morning meetings or preparing for a group activity. The participant overview was designed as a base for the web-based interface (see Figure 11). The overview is meant to support staff in creating individualised participant schedules and coordinating them with each other, ensuring that all aspects of the organisation align effectively, providing a stable foundation for its operations. Since this serves as a base structure, additional features and information are expected to be integrated into the interface during further development.

The main targets for this design are guidelines 4.1-4.3 (see Table 9). Emphasis has been put on creating an overview that enables easy access to relevant information, possibilities to reduce the amount of information, and visual features that clarify the information.

1. Participant & Organisation page

2. Participant schedule, color-coded based on place

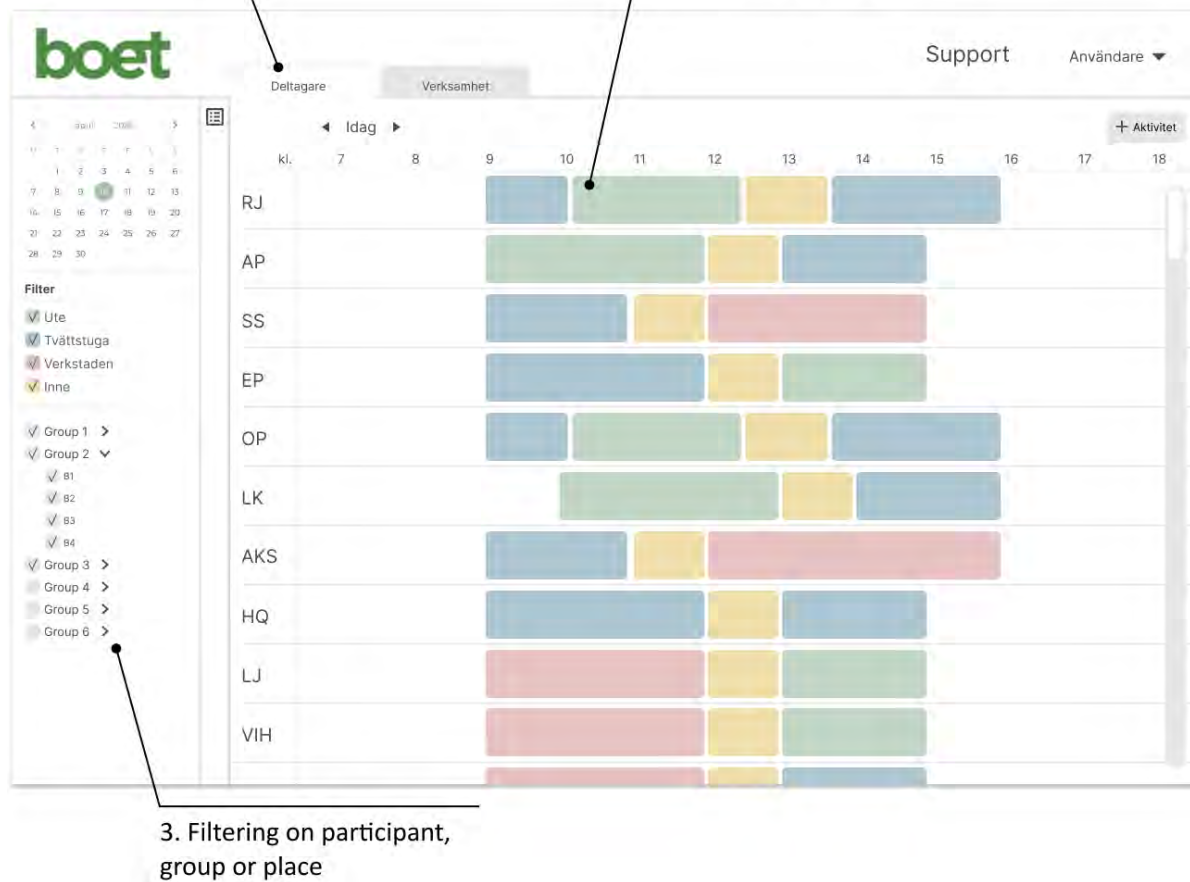


Figure 11. Wireframe of the participant schedule overview

Each participant's schedule is displayed in a horizontal row and stacked vertically (2). Due to confidentiality, participants are identified using acronyms or similar labels chosen by the user. Although schedules are shown vertically in the current Boet interface and users are familiar with that structure, the horizontal schedule rows allow a more natural scrolling pattern when a large number of schedules are viewed. Presenting the schedules tightly together creates a view where similarities and differences can be easily spotted, which supports the coordination of schedules. Additionally, each activity is colour coded after its assigned location, enabling staff to quickly scan which participants are in a location at a certain time. In the user study, location was addressed as a key area of consideration for both allocating staff responsibility and avoiding participant schedule conflicts. However, the user is free to categorise according to their preferences, using something other than place if preferred. The interface also includes a filter, enabling the user to choose which schedules are visible (3). To make the participant listings more manageable, the participants can be grouped according to the organisation's preferences. The filter function also allows the user to view activities in specific locations. Another measure to regulate the amount of information presented is that the interface shows only some information directly, but also provides easy and intuitive access to more detailed information. For example, by hovering over an activity

or clicking on a participant's name to get extended information. In this wireframe, no information, except colour (location), is directly visible for each activity. This was to discuss what information is needed from staff members during evaluations.

In addition to the schedule overview, the designed interface also provides weekly overviews for each participant, as in Figure 12. Rather than focusing on efficiency and information management of many schedules, this view targets guidelines 2.4, 2.5, 4.3 and 4.4 (see Tables 7 & 9). To facilitate and encourage a participant-centred mindset, this overview provides easy access to information and tools personal to each individual. In the profile to the left, the participant's schedule preferences, support needs, or other relevant information can be found (2). Participants can also choose an avatar from a library to represent them, enabling both personalisation and distinction of participants beyond their abbreviation (1). Additionally, templates for individualised activities can be used directly from the profile to simplify the scheduling process (3).



Figure 12. Wireframe of participant profile and weekly schedule overview

To enable the coordination of two specific schedules, this view provides the option of comparing schedules (see Figure 13). Through choosing a participant or organisation schedule (1), it is shown next to the participant's schedule (2). Only the schedule belonging to the participant whose profile is visited, in this case, participant B1, can be edited from this view.



Figure 13. Wireframe of comparison view

5.2 Activities

As in the current Boet interface, schedules are composed of individual activities. In this design concept, activities can be created from both main views through the *+aktivitet* button, or for a specific participant, by right-clicking on a participant's schedule or by hovering over an empty area in the schedule. When creating the activity (see Figure 14), general information (1) as well as picture aids, support aids for the participant's app, and support description for staff (2) are filled in by the user. Each activity includes information tailored to the specific participant and circumstances, providing support to both staff and participants through their respective mobile applications.

The new design concept also provides the possibility to create group activities, to meet guidelines 4.1 and 4.8 (see Table 9). When a user creates an activity (see Figure 15), they get the option of whether the activity is performed individually or in a group (1). When the group option is selected, the user can add multiple participants to the activity (2, 3). To consider guidelines 2.4 and 2.5 (See Table 7), individually tailored visual aids, activity support, and support descriptions are added for every included participant (4). In this feature, efficiency and user convenience must be balanced with encouragement of a participant-centred mindset. This design manages this balance through enabling the user to create a common base for multiple participants, eliminating the effort of manually entering the general information for every participating individual. However, all individual information still requires manual insertion to ensure that every participant's individual needs are attended to. To support the user in this, the interface allows them to save templates of individual information in a group activity (5), which can be used if the activity recurs by importing it into the new activity.



Figure 14. Wireframe of how an activity is created



Figure 15. Wireframe of how a group activity is created

5.3 Evaluation of Schedule Overviews and Activities

When evaluating the design concept with staff members, the design was received with curiosity and a positive attitude overall. However, there were also some points of feedback to consider in further development.

For the overview of participant schedules, users appreciated the ability to view all relevant information on a single page. However, some users expressed a concern that it could be difficult for their colleagues with lower technical experience to understand how the interface is used. Although they were confident that the colleagues would be able to learn after some practice, this further emphasises the importance of the

interface being easy to understand and use. Another user addressed that there would not be enough space to see the whole activity name if the activity is short, and that it would be appreciated if they could zoom in on the time axis to extend the width of activities. Although this feature exists in the current Boet interface, the user wasn't aware of it, indicating that the usability of this specific feature might need further consideration. Additionally, the colour-coding used to indicate the location of activities was highly appreciated by all users, but particularly at the DACs with many participants.

Regarding the horizontal scheduling view, a couple of users commented that it is unfamiliar, noting that their organisations typically use vertical scheduling formats. While this difference initially stood out, users acknowledged the potential benefits of a horizontal layout, particularly for showing multiple individuals' schedules simultaneously. Based on the usability heuristics, this is not optimal in terms of consistency and standards since most schedule overviews familiar to the user have a vertical time axis. However, those overviews typically have a schedule for several days rather than multiple schedules for the same day. Horizontal schedule overviews occur in several scheduling applications for treating a large number of schedules, for example, programs for scheduling staff.

All staff members participating in the evaluation agreed that the filter function is useful, but neither strong positive nor negative reactions were shown. However, when asking users to describe how they would use the filter, it became clear that some users didn't quite understand how it is supposed to operate. From a heuristic perspective, the filter function enhances the user control of the interface. Furthermore, there were indications that users would like the possibility to view organisation schedules and participant schedules in the same window.

The weekly overview and participant profile were not included in the evaluation with users. It was, however, spontaneously discussed at one of the sessions, since the users addressed the need for a participant-focused view. The staff members from this evaluation were very positive towards the weekly overview and emphasised that being able to add general information to a participant's profile would be of great value for them. Especially if the information is available in the mobile staff application as well.

The group activity function received positive reactions from all users in the evaluation and is something that they all found to be a useful feature, making the process significantly faster compared to the current interface. In general, the fact that the user is required to insert individual information for each participant in the activity was generally well accepted. However, one staff member pointed out the need for a general activity description, as some information will be relevant for all participants. Also, staff from one DAC mentioned that they would like to be able to see group activities collected in one place, for example, in the organisation's schedules.

5.4 Tasks

To support activities that can be carried out during the day without a fixed time, *tasks* were introduced to the interface as an additional feature to the overview base to target guidelines 4.5, 4.6 and 4.13 (see Table 9). These may be used tasks that can be completed at any point during the day, such as taking out the

trash, or activities that depend on events with unpredictable timing, such as accepting an incoming delivery.

Two concepts were developed where the tasks are created and presented differently. The reason for evaluating two concepts was mainly to facilitate discussion to explore how the feature can be perceived as simple to use while fulfilling user needs effectively. The following concepts additionally aim to support mandatory tasks and enable the shifting of the responsibility of a task between participants.

In common for both concepts is the feature of mandatory tasks (see Figure 16). Mandatory tasks can be extended from the side menu and are presented as a list divided into categories based on the place, which are the same as in the scheduling rows (1). If no place is chosen for the task, it is presented as unspecified (*Ospecificerad*). Any tasks can be assigned the feature to be mandatory and thereby appear in the list. The person assigned to the task is visible to the right of each task. By clicking on the task, the user can change who is responsible for it. *P* stands for *Personal*, which means staff, and any tasks, even those that originally were meant for a participant to do, can be assigned to staff. A red dot indicated that no one is assigned to do the task. In the two concepts, an exclamation mark shows if the task is mandatory in the participant's schedule. To enable reassignment of a task between participants, it will be necessary to support individual activity descriptions and activity support, which is something to be further developed.

Concept 1

In the first concept, tasks and activities are presented as two different features (see Figure 16). Tasks are created by clicking on + *Uppgift* (2), followed by a dialogue where task information can be entered (see Figure 17). When a task is saved, it appears in the schedule below the activities (3). Tasks are divided into All day (*Heldag*), Morning (*FM*) and Afternoon (*EM*) and are visible by default, but collapsible if preferred.

1. List of mandatory tasks with assigned person to the right

3. Field with tasks assigned to a participant, divided into All day, Morning & Afternoon

2. Button to create a task



Figure 16. Wireframe of concept 1 of how tasks can be integrated into the schedule overview

A. Add fundamental details about the task, such as participant, task name, day and time of the day, how often it reoccurs and place

B. Checkbox adding the task to the list of mandatory tasks

C. Add visual aid, activity support and a description of the activity for staff

D. Checkbox to save task in participant profile

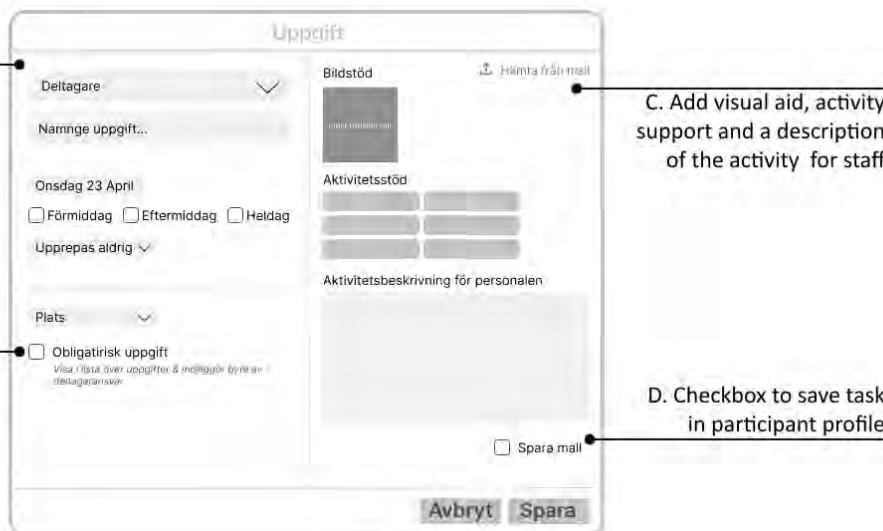


Figure 17. Wireframe of how to add a task in concept 1

Concept 2

In the second concept, tasks are presented as a feature of an activity rather than a separate type (see Figure 18). Tasks are shown as a number in the top right corner of an activity (3) or next to the participant's name if assigned to the whole day. The number indicates the number of tasks, and by clicking on it, the activity expands, showing task names (2).

To create a task, the button *+ Aktivitet* is clicked on (4), and a dialogue appears (see Figure 19). The creation of a normal activity is the default; to add a second task *+ Uppgift* is clicked on (B), collapsing the first one and the new task appearing below (C).

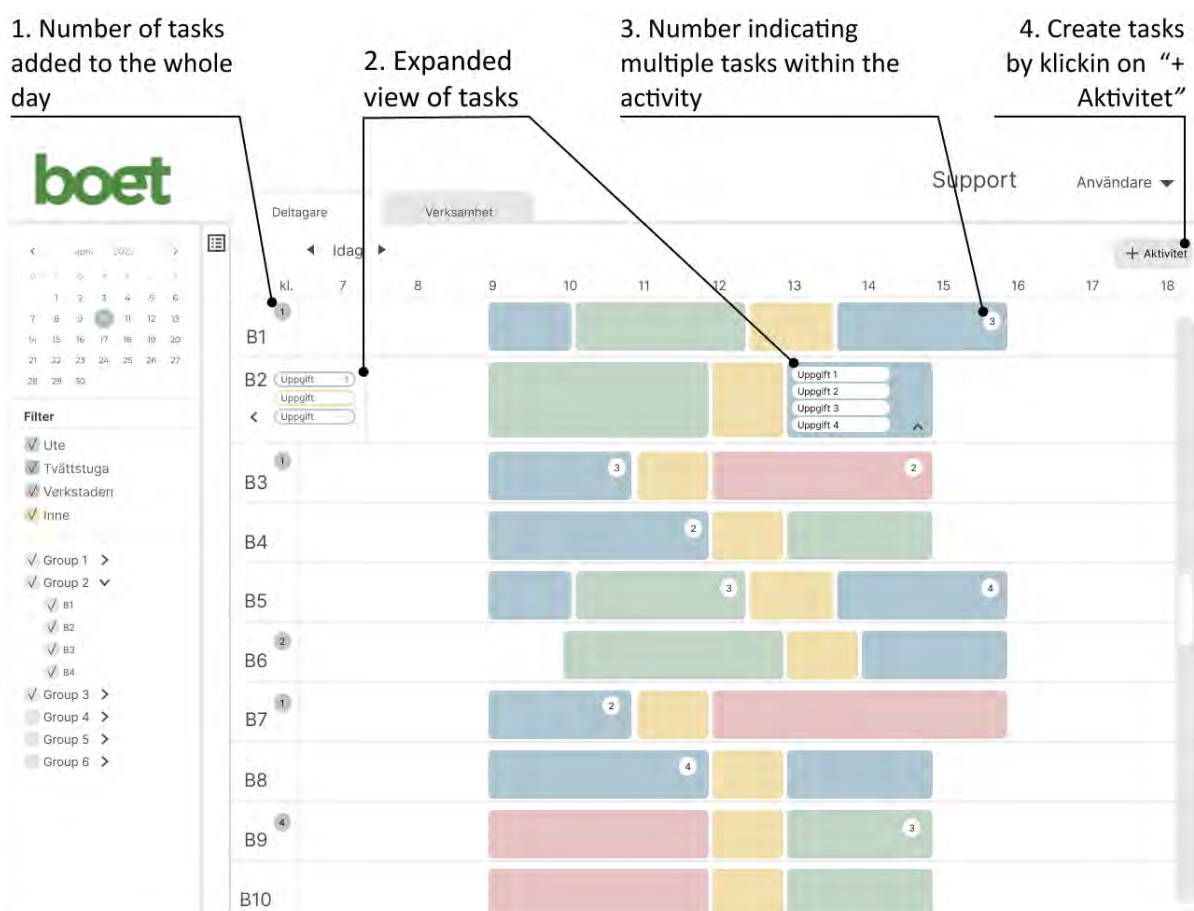


Figure 18. Wireframe of concept 2 of how tasks can be integrated into the schedule overview

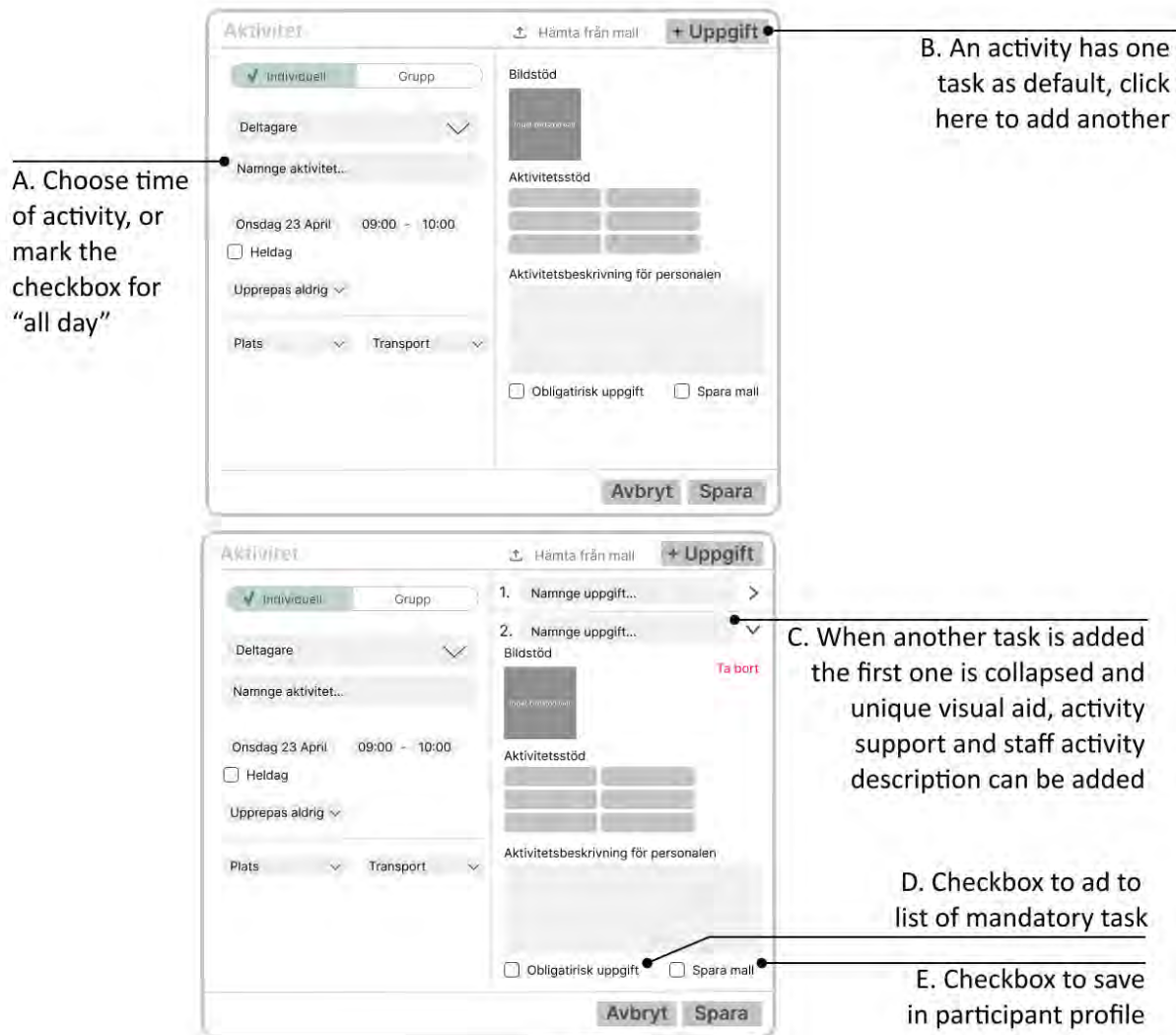


Figure 19. Wireframes of how tasks are created within concept 2

5.5 Evaluation of Tasks

The introduction of tasks and the list of mandatory tasks was well received among users. It was especially appreciated by the staff at one of the DACs since it aligned well with their planning structure. The other DACs were also positive to the idea and saw potential applications within their organisations. One staff member pointed out that the feature can entail opportunities for increased independence and autonomy for some participants.

Users expressed an interest in the combination of tasks and group activities. One user requested the possibility of allowing multiple participants to engage in the same task. Another DAC requested tasks within group activities and thought it could be useful when participants have individual responsibilities within an activity.

When comparing the two different concepts, most users favoured the default view showing all tasks, like in concept 1, particularly one DAC that primarily works with task-based planning. However, one user found this view overwhelming and recognised that colleagues with less technical experience could have even more trouble navigating the interface and sorting out what is relevant.

Feedback from the user interviews suggested that concept 1, where tasks and activities are separated, was perceived as easier to understand and use compared to concept 2. One user identified that it could be harder to define what a task entails in the second concept, especially considering the similarity to the activity support “che”. It could easily result in misunderstandings among staff, using the function for different purposes resulting in lack of consistency.

The second concept offers a higher degree of user control by allowing users to freely assign time spans to tasks, in contrast to the first concept, which only provides fixed options for morning or afternoon. This flexibility enables a higher level of structure in both planning and task execution, as users can define more narrow time spans, providing more guidance to participants on when to perform the task. Additionally, users perceived the connection to a specific place as clearer in the second concept. Since tasks can be assigned to custom periods, they can be scheduled when the participant is expected to be at the relevant location.

From the evaluation, both positive and negative aspects were identified for each concept, making it difficult to choose between them. Further development and evaluation are necessary to address user feedback and implement improvements.

5.6 Refined Schedule Overview

The figure below illustrates how the interface could appear in a more polished, implementation-ready format (see figure 20). The design builds on Boet’s existing visual language and has a small improvement compared to the previously presented schedule overview: a *more* icon (≡) in the top-left corner, providing access to advanced or infrequently used features and information. Regardless of which design task concept is implemented, clicking the *Skapa* (Create) button opens a contextual menu with multiple options, allowing users to create an activity, a group activity, or a task. How task will be presented in the interface is dependent on which of the concepts are implemented, and since it would require a lot of improvements to meet the user's needs, it is not included in this visualisation.

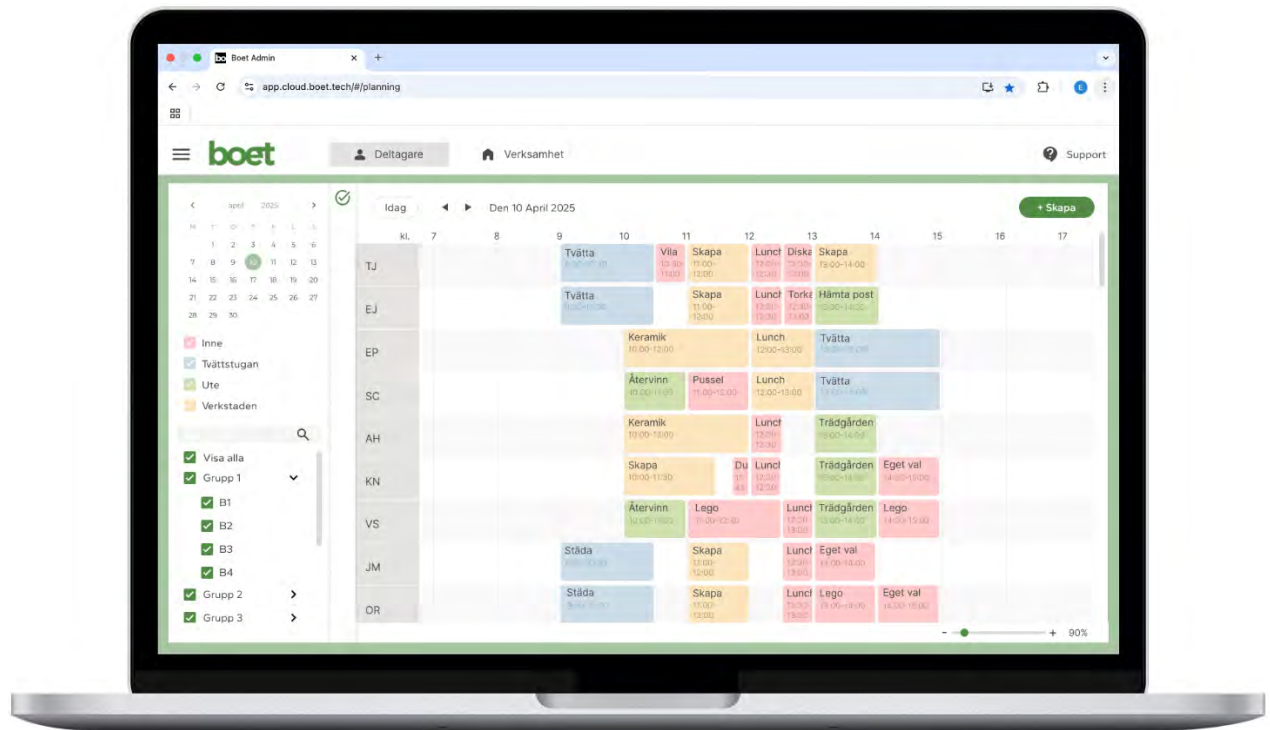


Figure 20. Refined visualisation of the schedule overview

6. Discussion

This chapter reflects on the study's findings, focusing on how the digital scheduling interface meets the needs of both participants and staff at DACs. It discusses key challenges, method effectiveness, and the guidelines and design concepts potential to support equality, quality of life and societal participation for people with cognitive disabilities at DAC.

6.1 Balancing the Needs of Staff and Participants

In the context of this thesis, which aims to support participants in activities at DACs, the individual entitled to support is the central stakeholder, as their needs form the foundation of the organisation's purpose. However, the staff are responsible for delivering this support and creating a plan for how to meet participant needs. Therefore, developing measures that assist staff is a crucial step toward achieving the overarching goal: increasing equality, quality of life, and societal participation for the participants at DAC.

Balancing the needs of participants with staff preferences has been one of the major challenges in this project. Supporting staff does not necessarily mean fulfilling all their wishes or ensuring maximum comfort at work. Rather, it entails identifying what they need to provide the best possible support for participants. During this project, it has become evident that staff are not always aware of what these needs are, as they might be subconsciously more inclined to prioritise their own comfort. Because of this, it has been important to keep a critical eye on the staff's perspective, making sure that satisfying their expressed needs will not conflict with the participants' well-being.

One example of this conflict is the developed task feature. When talking to staff, some clearly expressed a need for scheduling activities without a time frame. The motivation for this was that the environment is too dynamic to specify an exact time for an activity. However, excluding an indication of when a participant is expected to engage in an activity can compromise the needed clarity to function independently at work. Therefore, omitting time indications could be a result of staff wanting to control the daily schedules spontaneously, depending on what is most comfortable for them. On the other hand, allowing participants to operate more freely and independently decide when to engage in an activity could strengthen their influence and independence at work. The effects of the task feature depend on the needs of individual participants and require responsible use and individual adaptation. It is also important to consider these conflicts when developing interfaces for supporting activities at DACs, to minimise the risk of irresponsible use and encourage optimal use.

To manage this balance, interviewing participants and understanding their perspective and experience of DACs was central. The Boet team is acting as advocates for participant needs, and their goals align with the long-term goals of LSS. Given the team's extensive experience in LSS organisations and working with individuals with cognitive disabilities, they were able to provide a critical perspective on the staff's expressed wishes and identify potential misuses of the tool that may not align with the participants' best interests.

Although participant needs are the highest priority, satisfying staff needs is of high importance. A pleasant work environment and staff well-being enable a positive atmosphere and high-quality support for participants. Therefore, an administrative tool should strive to maintain a balance between satisfying staff needs and challenging problematic work methods. Too much pressure without consideration of staff needs can lead to staff finding usage shortcuts to fit their preferences. When the product is not used as intended, it becomes difficult to predict its effects. The administrative tool must make it easy for staff to act based on what is best for participants.

Given this context, it was important to capture both participant and staff perspectives on a digital scheduling software. The following sections reflect on how well the employed process captured their needs and challenges and how it could be improved.

Empathising with the Staff Perspective

Staff is not a homogenous group, they can have different responsibilities and work tasks, resulting in a variety of perspectives on the needs and challenges at the DAC. Some staff members have worked for many years and bring extensive experience and knowledge. Several have higher education, such as special needs educators, and more responsibilities, which gives them a different perspective. Others are new, or substitutes and therefore have limited knowledge about the participants and organisation. There are also managers and people not working directly with participants, but with greater responsibility for how the DAC is managed and with ultimate responsibility for the participants' well-being. Commonly seen during the studies were managers with a high ambition for how to structure the work at DAC, while the day staff found it hard to implement.

Three out of the four staff interviews were conducted with both staff and managers present. With the higher degree of power that the manager has, staff might want to make a good impression and say what the manager wants to hear. In the timeline activity, the theory of how to plan at DAC might be different from how it actually works. In the interview with more than one person present, the timeline activity got a bit messy, leading to one person taking initiative and others' perspectives being more hidden. However, the timeline activity enabled interesting discussions revealing some differences between staff and managers' perspectives. Likely, some challenges and needs did not come to light. As a result, certain perspectives that are highly relevant to the development of a scheduling interface in this context may not have emerged during the study.

Empathising with the Participant Perspective

Even though it was decided early on that the focus was most likely not going to be on the participants' part of the interface, it was found to be crucial to capture the participants' perspective. The visual scales did, in general, work well with all participants understanding the task. The method requires the participants to take a stand, which can prompt reflection on why they feel a certain way. It was found useful, since the goal was to find out how the participants feel without previous reflection on the topic. The result of the card placement by itself didn't provide much meaning. It was rather the discussion and comments

regarding the placements that provided valuable information. Most participants placed the majority of their cards on the end of the scale perceived as more positive, with one participant placing all but one card on that side. This raised the concern that participants may not have placed the cards based on their true feelings, but rather according to what they believed was the desired response. However, the following discussions helped to clarify, offering insight into which aspects were perceived more positively than others.

Participants elaborated on their answers to varying degrees. While some offered detailed reflections, others responded with short sentences or single words. This variation was partly because of differences in cognitive abilities, but also due to the unfamiliar nature of the interview situation, something participants were not used to and where expectations were unclear to them. Two participants, for example, gave brief answers during the interviews but were noticeably more verbal and expressive in informal settings where they felt more comfortable. For these individuals, the interviews might have yielded richer and more detailed responses if they had been conducted in a more familiar or natural context. As a result, the study may present an uneven representation of the user group, with the perspectives of participants who were more comfortable expressing themselves being more prominently reflected. A way of improving this could be getting to know the participants better or letting them get more familiar with the material in advance.

The degree to which staff are involved is also identified as a factor that could affect the outcome of the participant interviews. In one of the interviews, critiques towards staff were expressed, which provided insights that would most likely not have been brought to light if a staff member were present. On the other hand, staff could provide support in communication or make the participants feel more comfortable, potentially adding value by better capturing the perspectives of less verbal participants. However, it is difficult to know how much the presence of the staff affects the participants' answers, which must be taken into consideration when analysing the results.

6.2 Implementation of Design Guidelines

The result of the user study is a complex description of the context, challenges and needs at DAC, which was summarised into more manageable information through a list of design guidelines. The list is similar to, but not to be mistaken with, requirements since the guidelines aren't meant to be directly measurable, since they reflect complex goals. The list is meant to provide guidance and direction in the development of a planning interface at DAC to make sure that all aspects are considered. However, because of the nature of the study, visiting only five different DACs, it can't be guaranteed that all important aspects are covered. When implementing an interface based on these guidelines, its success must be tested and evaluated in diverse contexts. Such measures should evaluate how well the interface meets the guidelines and capture new perspectives to add to the list of guidelines. Ideally, the list is under continuous development as new information is revealed.

The guidelines were weighted based on their importance, which was estimated based on interpretations of the findings in the user study. It can provide guidance in what to prioritise when designing, but can't be seen as the truth if, for example, needing to prioritise between guidelines. If prioritisation is necessary,

the judgement should be based on how it affects the solution as a whole rather than which guideline has the highest weight.

6.3 The Potential of the Design Concept

The designed interface primarily aims to address guidelines 4.1-3, 4.5 and 4.8, but also to address the overarching goals represented in guidelines 1.1-2.7. In this chapter, the design concept and its potential for further development are discussed in relation to the prioritised guidelines, system goals, and organisational goals.

Prioritised Guidelines

The user evaluation gave indications that the designed interface has good potential to enable efficient planning and therefore meet guideline 4.1 (*Enable efficient planning and scheduling*). The features of planning group activities and considering location availability in planning were especially appreciated in relation to efficiency. However, there are additional measures that could increase the efficiency further. For example, by including working with intuitive interaction patterns for editing schedules directly from the overviews. This could include editing the time of an activity by clicking and dragging the edge of an activity. To ensure that such interaction increases efficiency, it is important to analyse risks of user error to avoid accidental edits and maintain a sense of user control. Additionally, staff responsibility allocation is one of the current features which is the most insufficient to use. This was not prioritised during this project, however, the feature requires consideration in further development to enable efficient planning throughout the interface. This is especially important since the new task feature brings additional complexity to staff responsibilities. In general, when developing the interface to further increase its efficiency, it is important to continuously weigh its remaining guidelines to not compromise in structure or support quality.

Considering that the staff members at DACs generally have low digital proficiency, it was shown to be especially important to not overwhelm the user with information. This is reflected in design guideline 4.2 (*Present a relevant and manageable amount of information*). At the level of abstraction the developed design is currently in, it is difficult to fully evaluate how manageable the amount of information is. However, the evaluation unveiled indications that the presented information could be unmanageable for some users. Therefore, this guideline should be continuously considered, prioritised and tested in further development.

Additionally, it seemed difficult for staff to fully grasp what the interface implied for their possibilities of coordinating schedules. This makes it difficult to understand how well guideline 4.3 (*Facilitate coordination of participant schedules*) is met. As with guideline 4.2, this is likely due to the high level of abstraction in the evaluated design and must be tested again after further development. However, staff were generally positive towards the measures taken to meet the guidelines, such as colour coding and filters.

As presented in the results, the feedback received on the group activity feature was generally very positive. This implies that guideline 4.8 (*Support efficient planning of group activities*) is well met by the designed

interface. When designing this feature, it was central to find a balance between increased efficiency and individual consideration of each participant. Although this was well received during evaluations, the possibility of including general information was requested to increase the efficiency further. This is a relevant consideration for further development. However, it could result in staff using the feature to avoid the hustle of individually tailoring information for participants and therefore compromise the support quality. Therefore, if such a feature were to be considered, it is important to examine how to minimise that risk.

Guideline 4.5 (*Support planning of activities without a specified timeframe*) can be considered satisfied since all staff participating in the evaluation were positive towards the task feature. However, the effect of implementing tasks in Boet may bring varying value depending on the organisation's structure and the needs of the participants. Overall, the feature shows large potential to positively impact participants autonomy and independence and encourage correct information in the schedule. To effectively do so and to minimise the risk of irresponsible use, the design of the task feature needs further refinement by combining the benefits of the two concepts. First, the intended use of tasks needs to be clearly communicated to the user. It must be easy for the user to understand the difference between tasks and activities, and intuitive to use. Secondly, the feature should allow user control in such a way that users can utilise it to best suit their participants' needs. For example, by allowing users to define personalised time frames for tasks. Finally, it is important to further examine the potential risks of implementing tasks within a scheduling tool to ensure that the feature is not misused as a substitute for structured planning. For example, setting a limit on the number of tasks per day could help maintain clarity and prevent the schedules from becoming disorganised or overwhelming.

System Goals

Since the full product system is not fully developed, it is impossible to tell how well the solution meets the system goals. However, a judgment can be made on whether the concepts are contributing to the goals if implemented within a full product system.

Since the developed solution is an interface for planning participant schedules, it is intended to support the planning of activities through a structured methodology, providing a solid foundation for achieving goals 2.1 (*Support planning of activities at daily activity centres*) and 2.2 (*Facilitate a structured work methodology*).

Goals 2.3 (*Clearly communicate when, where, and how participants should engage in an activity.*) and 2.7 (*Enable purposeful usage by participants with various levels of support need*) are very dependent on the part of the interface which the participant interacts with and therefore something to be considered forward. As DAC participants include individuals with lower support needs than those typically found in group homes, the development of the participant app must pay particular attention to addressing the needs of this subgroup. Another challenge for the participant app is to communicate "when" to perform a task. It must be clear that they are free to choose when to complete the task or within which time frame it should be done. Additionally, goal 2.6 (*Facilitate professional and trustful relationships between staff*

and participant) is not specifically addressed and will be especially important to consider when designing for division of staff responsibilities.

Goals 2.4 (*Support daily activity centres in providing all participants the support they need*) and 2.5 (*Facilitate and encourage a participant-centred mindset in planning*) have been under constant consideration when developing the design. The foundation developed aims to provide good prerequisites to plan for high-quality support for participants. For example, by considering how to give individualised support within group activities and the participant profile page.

Organisational Goals

Zooming out further, the organisational goals (*Promote a meaningful work life, Facilitate personal growth for participants, Support participants in feeling and being independent & Promote participant influence*) serve as a framework within which all other guidelines and goals operate. However, since these goals depend on many factors beyond the interface itself, it is not possible to assess how well the concept contributes to achieving them in isolation. To evaluate this, the interface must be considered in the context of its implementation and examined alongside the surrounding environment. Nevertheless, since the other guidelines and goals support the organisational goals, assessing the extent to which these are fulfilled can offer insight into the concept's potential contribution to the broader organisational context.

Overall, creating the necessary conditions for reaching the organisational goals will most likely enhance the prerequisites for improved quality of life for DAC participants. The implementation of a digital interface aligned with the developed guidelines can also enhance autonomy and independence. Additionally, the introduction of a digital tool may lower the threshold for using other digital services, thereby reducing digital exclusion. In turn, this may contribute to increased societal participation for individuals with cognitive disabilities at DACs.

7. Conclusion

The aim of this thesis has been to examine how a digital interface can support daily work activities for individuals with cognitive disabilities in a way that promotes inclusion. To do so, the context, challenges, and user needs for staff and participants in their practices at the DAC have been explored through interviews with both user groups. DACs often have the responsibility to support a large number of participants with highly varying needs, which increases the demands on schedule coordination and makes planning for individualised support time-consuming. It is also common to pursue activities in groups and to offer work tasks that are difficult to fit into a specified time frame. Additionally, the environments of DACs are often dynamic, which emphasises the need for flexible planning. These are qualities that distinguish DACs from group homes and therefore generate needs especially important to consider when extending Boet to the DAC user group. Based on insights from interviews, design guidelines have been established to emphasise core aspects in need of consideration when designing a digital tool supporting structured planning at daily activity centres. Apart from specific challenges and needs, these include organisational goals such as creating a meaningful work life and product system goals such as facilitating a participant-centred mindset in planning.

Although slightly limited by the study's sample, the complete list of guidelines is an important outcome of this thesis, capturing the range of activities and pedagogical tools at DACs that would benefit from digitalisation and therefore answers research question 1. Within this list, however, certain guidelines have been identified as particularly urgent for implementation in a product extension for Boet. These represent the needs at DACs that, based on the user study, are perceived as most vital for a functioning planning structure, and which are poorly addressed by the current Boet interface. These include *Enable efficient planning and scheduling*, *Present relevant and manageable amount of information*, *Facilitate coordination of participant schedules*, *Support planning of activities without specified timeframes*, and *Support efficient planning of group activities*.

Further, the selected guidelines have informed the development of design concepts for an administrative scheduling tool, to address research question 2: *How can a digital interface be designed to facilitate daily work activities, and increase equality, quality of life and societal participation for individuals with cognitive disabilities?* The designed interface includes colour-coded schedule overviews with filter features, to address the needs related to efficiency, schedule coordination and information. The concept also includes a solution for how group activities can be created and managed in the interface to increase efficiency while ensuring individualised support for each participant. Lastly, two concepts for tasks have been presented and discussed to address the occurrence of activities without specified timeframes.

Overall, the developed interface has strong potential to facilitate daily work activities for both staff and participants at DAC, particularly in enhancing scheduling efficiency and facilitating the management of group activities. However, to fully assess the effect of the design, it needs to be further developed and tested. It is recommended to continuously consider and prioritise how information is presented to minimise cognitive load for the user, and to further evaluate how the interface affects the users' ability to

coordinate schedules. Additionally, the task feature should be further developed through combining the main benefits of the two concepts to optimise clarity, user control and a participant-centred mindset.

In a more general sense, conflicting goals of staff and participants can entail significant challenges in the development of the digital tool. In these cases, it is important to strive for a constructive balance where staff needs are valued and considered, but participant needs are prioritised. It is also important to consider that, regardless of design solutions, the interface's effect will depend heavily on how it's used, which will vary between DACs. This emphasises the importance of continuous testing and evaluation of the design, also after implementation.

In conclusion, although the design presented in this thesis needs refinement and further consideration, it demonstrates promising implementations of design guidelines that support the organisational goals of DACs. Further, the discussion has established that supporting the organisational goals through a digital tool can increase digital inclusion and enhance participants' independence. Therefore, a digital interface that is developed and evaluated in accordance to the defined guidelines, combined with responsible use, can contribute to increasing equality, quality of life and societal participation for individuals with cognitive disabilities.

8. References

- Aronsson, K. (n.d.). *From digital exclusion to digital inclusion*. The Greater Stockholm Disability Rights Federation. Retrieved 24 January 2025, from funktionsrattstockholmslan.se/
- Braun, V., & Clarke, V. (2006). Using thematic analysis in psychology. *Qualitative Research in Psychology*, 3(2), 77–101. <https://doi.org/10.1191/1478088706qp063oa>
- Boet. (n.d.). *Om oss [About us]*. Retrieved 23 May 2025, from <https://www.boet.se/om-oss/>
- Cambridge, P., & Forrester-Jones, R. (2003). Using individualised communication for interviewing people with intellectual disability: A case study of user-centred research. *Journal of Intellectual & Developmental Disability*, 28(1), 5–23. <https://doi.org/10.1080/136682503100008687>
- Goal 8 | Department of Economic and Social Affairs. (n.d.). Retrieved 23 May 2025, from https://sdgs.un.org/goals/goal8#targets_and_indicators
- Goal 10 | Department of Economic and Social Affairs. (n.d.). Retrieved 23 May 2025, from https://sdgs.un.org/goals/goal10#targets_and_indicators
- Lee, K., Cascella, M., & Marwaha, R. (2025). Intellectual Disability. In *StatPearls*. StatPearls Publishing. <http://www.ncbi.nlm.nih.gov/books/NBK547654/>
- Lord, C., Elsabbagh, M., Baird, G., & Veenstra-Vanderweele, J. (2018). Autism spectrum disorder. *The Lancet*, 392(10146), 508–520. [https://doi.org/10.1016/S0140-6736\(18\)31129-2](https://doi.org/10.1016/S0140-6736(18)31129-2)
- Mesibov, G. B., Shea, V., & Schopler, E. (2004). *The TEACCH Approach to Autism Spectrum Disorders*. <https://doi.org/10.1007/978-0-306-48647-0>
- Murphy, J., Tester, S., Hubbard, G., Downs, M., & MacDonald, C. (2005). Enabling frail older people with a communication difficulty to express their views: The use of Talking Matstm as an interview tool. *Health and Social Care in the Community*, 13(2), 95–107. <https://doi.org/10.1111/j.1365-2524.2005.00528.x>
- Nielsen, J. (1994, April). *Enhancing the Explanatory Power of Usability Heuristics*. The SIGCHI conference on Human Factors in Computing Systems. <https://doi.org/10.1145/191666.191729>
- Siu, A. M. H., Lin, Z., & Chung, J. (2019). An evaluation of the TEACCH approach for teaching functional skills to adults with autism spectrum disorders and intellectual disabilities. *Research in Developmental Disabilities*, 90, 14–21. <https://doi.org/10.1016/j.ridd.2019.04.006>
- Slaughter, V. (2024). Autism. In *Salem Press Encyclopedia of Health* (Vol. 2024). Research Starters

- Socialstyrelsen. (n.d.). *Att Förebygga och Minska Utmanande Beteende i LSS-Verksamhet*. Socialstyrelsen. www.socialstyrelsen.se
- Socialstyrelsen. (2022, August 17). *Daglig verksamhet, LSS*. Socialstyrelsen. <https://www.socialstyrelsen.se/kunskapsstod-och-regler/omraden/funktionshinder/daglig-verksamhet-lss/>
- Socialstyrelsen. (2024a). *Leva som andra och vara delaktig i samhället. 2024-12-9355*. socialstyrelsen.se/publikationer
- Socialstyrelsen. (2024b). *Statistik om insatser enligt lagen om stöd och service till vissa funktionshindrade*. Socialstyrelsen. socialstyrelsen.se/statistik-och-data/statistik/alla-statistikamnen/personer-med-funktionsnedsattning/
- Statistiska centralbyrån. (2022). *Undersökning av Levnadsförhållanden (ULF)*. Statistiska Centralbyrån. www.scb.se/hitta-statistik/statistik-efter-amne/befolkning-och-levnadsforhallanden/levnadsforhallanden/undersokningarna-av-levnadsforhallanden-ulf-silc/pong/tabell-och-diagram/statistik-om-personer-med-funktionsnedsattning/tabeller-2022/
- Wikberg Nisson, Å., Ericson, Å., & Törlind, P. (2015). *Design—Process och Metod* (1:1).

9. Appendix

Appendix A: Design Guidelines

Importance (relevance to Boet)

- 1 = The system should avoid conflicting with the guideline
- 2 = The design should include strategies to meet the guideline
- 3 = The design must include clear strategies to fulfil the guideline

Boet Compliance (degree of guideline fulfilment in current product)

- ✓ = The guideline is sufficiently met
- ! = The guideline is partially met
- X = The guideline is not met at all

Design guideline	Importance	Boet Compliance	Comment
1 Organisational Goals			
1.1 Promote a meaningful work life	1		Frequently mentioned in studies and often referred to as e.g. including tasks that are similar to regular employment and/or affect others.
1.2 Facilitate personal growth for participants	2		e.g. meet goals from "genomförandeplan". Note: It's important to find a balance between challenge and comfort
1.3 Support participants in feeling and being independent	3		
1.4 Promote participant influence	2		Over personal schedules and workplace in general
2 System Goals			
2.1 Support planning of activities at daily activity centres	3	!	
2.2 Facilitate a structured work methodology	3	!	
2.3 Clearly communicate when, where, and how participants should engage in an activity.	3	!	
2.4 Support daily activity centres in providing all participants the support they need	3	!	The product should contribute to participants getting support tailored after their unique needs and ambitions, often referred to as "individualised support".

2.5	Facilitate and encourage a participant-centred mindset in planning	3	!	Limit the risk of staff making decisions based on their own preferences instead of what is best for the participants.
2.6	Facilitate professional and trustful relationships between staff and participants	2	!	
2.7	Enable purposeful usage by participants with various levels of support needs	3	!	

3 Participant Support

Direct support

3.1	Support participants with executive abilities	3	!	
3.2	Support participants in managing work/rest balance	1	!	
3.3	Support participants with time management	3	✓	

Structure & emotional security

3.4	Facilitate consistent support for participants	3	!	Participants should receive the same support, regardless of which staff member provides it.
3.5	Support participants in understanding and accepting schedule changes	2	X	To minimise stress caused by necessary changes
3.6	Facilitate mental preparation of workday for participants	1	!	Some participants want to see their schedule in advance
3.7	Communicate to participants who to turn to for support	1	X	

4 Planning

Large number of participants

4.1	Enable efficient planning and scheduling	3	X	Limit the time needed for administrative tasks while maximising the quality of participant support. Limit unnecessary elements, such as learning the interface and clicking around.
4.2	Present a relevant and manageable amount of information	3	X	To ease cognitive load

4.3	Facilitate coordination of participant schedules	3	X	Expressed need for a schedule overview. i.e. consideration of several participants' schedules simultaneously. To avoid scheduling conflicts and enable planning of staff responsibilities.
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4.4	Enable distinction of participants	2	!	Because of confidentiality, it might not be possible to write out the participants' full names
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Context-specific factors

4.5	Support planning of activities without a specified timeframe	3	X	e.g. unpacking deliveries that arrive at an unknown time within a timeframe or activities that can be done at any point during a day. To enable a freer working methodology for participants and increase autonomy, while providing structure and support.
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4.6	Support management of mandatory tasks	2	X	Participants at the daily activity centre are expected to complete certain tasks. If a participant is unable to carry out a task, the system should provide support in managing it
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4.7	Support consideration of available resources	2	X	e.g. car or facilities.
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4.8	Support efficient planning of group activities	3	!	
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4.9	Support planning of activities with external parties	1	!	External parties can be other groups or daily activity centres
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Dynamic Environment

4.1	Support staff in making situation-based adjustments to plan	2	X	i.e. keeping structure while allowing necessary adjustments after short-notice factors such as absent staff or participants
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4.11	Support staff in prioritising activities based on participant needs	1	X	If changes in the schedules are needed staff sometimes must prioritise activities, that should be done with the participants' needs in mind.
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4.12	Promote correct information in schedule	3	!	Correct information in schedule is important to enable participants relying on their schedule and enable emotional security at the DAC.
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4.13	Enable shifting the responsibility of a task between participants	2	!	
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Evaluation and development

4.14	Promote continuous development of participant plan	2	X	Continuous development of participants' DAC activities and tasks to enable personal development
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5 Staff Responsibilities

Allocate responsibility

5.1	Support (responsible) division of responsibility staff for	3	!	Responsibility should be assigned with participants' long-term wellbeing in mind, avoiding decisions based solely on staff preferences
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5.2	Encourage rotation of responsibilities	2	!	Rotation of responsibility is important so that all staff work with every participant
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5.3	Enable situation-based adaptations of staff responsibilities	2	✓	
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Staff Support

5.4	Clearly communicate each staff member's individual tasks and responsibilities	3	!	Especially important, which participants the staff member is responsible for.
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5.5	Communicate to staff whether other responsibilities have been addressed or still require attention	2	!	Helping staff to trust that things get done even if they are not responsible themselves
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5.6	Support staff in knowing when participants need support	3	!	
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5.7	Support staff in how to support participants	3	✓	
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6 Communication

Need to be considered, but must not necessarily be a part of the Boet solution

6.1	Facilitate participants' communication about DAC with external parties	1	X	External parties can for example be other DACs, a group home or a legal guardian.
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6.2	Facilitate communication between participants and staff	1	!	
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6.3	Support staff in interpreting the state/prerequisites of the participants	1	!	
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